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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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BRIEFLY TOLD.

CURRENT COMMENT.—

IT is now positively asserted that control of the stock in the Cleveland (O.) Gas Light and Coke Company and the Peoples Gas Light Company, of the same city, has been acquired by the Columbia Company, of West Virginia, of which corporation Mr. A. S. White is the active man—Mr. White is a resident of New York. No change will be made in the executive management of either of the named Companies until the annual meeting of each has been held, which meetings will not take place until the days set for same, early next January. Mr. M. S. Greenough, President of the Cleveland Gas Light and Coke Company, is quoted by the Cleveland *Leader*, of the 13th inst., as saying that the transfer details will be made known the first week of the new year.

A CORRESPONDENT in Denver, Col., writing under date of the 10th inst., incloses the following: "The employees of the Colorado Springs (Col.) Gas Company and of the Colorado Springs Electric Company, the interests of which are under the same control, have organized the Utility Club, the objects of which are the social and business benefiting of the employees. Its first regular meeting was held the 7th inst., and the officers elected were: President, Ira A. Miller; Vice-President, Donald Kennedy; Secretary, T. P. Bray. These gentlemen, with Messrs. E. P. Dillon and G. F. Hendrickson, comprise the Board of Directors. The Club comes into activity with a membership of 43, and its by-laws provide for semi-monthly meetings, the first and third Friday evenings of each month. Another excellent provision in the governing rules is that the sessions, in so far as the reading and discussion of papers is concerned, are to be open to the presence of the residents of the city. At the organization meeting a very interesting paper on "The Mechanism, Care and Repair of Electric Meters," was read by Mr. R. J. Clark, whose efforts were well repaid by a very interesting discussion on some of the salient points—of which there were many—in the paper. The social features of the session were many, and all to the good."

WE understand that the Lynn syndicate, of Detroit, Mich., who for some time have controlled and operated the gas and electric systems in Quincy, Ills., has virtually concluded terms under which Mr. Lynn and his associates will secure control of the Quincy Street Railway Company's possessions.

MR. WALTER K. SHARPE, Acting-Secretary of the Chambersburg (Pa.) Gas Company, says that at the annual meeting of the Company, which is called for January 7, 1907, outside the usual routine matters, the proposition to increase the capital stock from $49,725 to $100,000 will be considered.

AT the annual meeting of the Capital City Gas Company, which was held some days ago in Montpelier, Vt., the officers elected were: Directors, F. Blanchard, G. L. Blanchard, A. C. Blanchard, J. Warren Lamb and E. H. Deavitt; President, Fred. Blanchard; Vice-President, A. C. Blanchard; Treasurer, E. H. Deavitt; Clerk, F. N. Smith; Supt., W. C. Bill; Executive Board, Fred. Blanchard, G. L. Blanchard and A. C. Blanchard.

THE Fairmont (W. Va.) Gas Company has been incorporated with a capital stock of $50,000.

ON the petition of the Municipal Gas Company, of Albany, and of the Albany Electric Illuminating Company, Mr. Justice Fitts has granted alternative writs of prohibition restraining the State Commission of Gas and Electricity from examining complaints against the named Companies as to price, quality and pressure of gas, and the rates charged for electricity in that city. The orders were made returnable before Justice Fitts, in Albany, the 10th inst., but by agreement arguments on the matter involved were put over to the morning of the 24th inst. It is understood that the objections by the petitioners will include the declaration that the Act under which the Commission was appointed is in conflict with the Constitution of the State.

MR. C. F. CATTELL, Managing Superintendent of the Chester County (Pa.) Fuel and Light Company, reports that satisfactory progress is being made on the Avondale and Kennett Square extension.

THE merger between the Symmes Gas Company and the Chatham Gas and Electric Company, of Chatham, Ont., has been completed.

MR. HENRY G. HAAS has prepared an ordinance for presentation to the City Council of St. Paul, Minn., which provides for the appointment of an inspector of gas and gas meters for that city. It is likely that before the ordinance is finally passed—and passed it is likely to be—it will have been amended to cover the "inspection of electrical currents," and the meters through which the volume of such is measured. We earnestly hope that the embryonic inspector will furnish us with a photograph of the first "electrical current" that he "inspects."

MR. E. F. LLOYD, and his right-hand man, Mr. Royal Schacklette, respectively President and General Manager of the Adrian (Mich.) Gas Company, having examined the situation thoroughly, have virtually determined to arrange for the supplying of gas to the outlying district of Tecumseh, providing a satisfactory franchise respecting the governing of the Company's relations with those of the townspeople be granted. The quiet Mr. Lloyd is not inclined to take everything for granted, as the residents of that Indian named reservation will speedly comprehend.

THE United Gas Improvement Company has turned over its interests in the Connecticut Railway and Lighting Company to the Consolidated Railway Company, under a leasing arrangement. This fact brought forth the announcement from the Bridgeport (Conn.) *Standard* that the same explained why President A. M. Young of the Connecticut Railway and Lighting Company told the truth when he said the properties were not sold. No; they were only leased for the term of some hundreds of months or so! True for you, Mr. Young.

THE Lighting Committee of the New London (Conn.) Court of Common Council has prepared the following report for the "Court," which explains itself:

"Following prescribed custom your committee on street lights presents herewith its annual report for year ending Sept. 30, 1906. The appropriation for street lights for the year was $21,500. There was expended $20,726.38, leaving a balance returned of $773.62. There have been added during the year 4 arc and 30 bug lights. After giving the matter considerable attention, and acting under your instructions your committee finally obtained what it considered a very good proposition for a 3 years' contract from the New London Gas and Electric Company. Your committee unanimously reported in favor of accepting this proposition and your body also with a practically unanimous vote adopted this committee's report and authorized the making of a 3 years' contract.

"Your committee is pleased to report that by this action, following the practice of every Connecticut city and town of over 10,000 inhabitants, your body has saved the city of New London approximately $1,000 a year, or nearly $3,000 during the life of the contract. While this contract was not executed till June 22, it was made effective from December 1, 1905. One year has already expired and your committee feels warranted in saying that it is not likely any revolution in lighting systems, by which the city could profit, will take place in the next 2 years.

"During the past year each light and post has been numbered and tagged, rendering identification easy for the officers of the police force, whose duty it is and has been for years to report lights out on their beats. Your committee wishes to commend the good work of the police force in performing this duty.

"Allowances for outages during the year have amounted to $106.05, which were deducted each month from bills rendered. By renumbering the lights, constituting an inventory, the Company supplying the same discovered that 10 lights had been added to the list at various periods without being charged up to the city. By agreement with the Company no claim against the city for payment for these lights was made. Your committee has recommended that the sum of $21,000, $500 less than the year previous, be appropriated for the coming year."

[AS FURNISHED BY THE OFFICIAL STENOGRAPHER.—Continued from page 846.]

PROCEEDINGS, FIRST ANNUAL MEETING, THE AMERICAN GAS INSTITUTE.

HELD IN THE AUDITORIUM HOTEL, CHICAGO, ILLS., OCTOBER 17, 18 AND 19, 1906.

FIRST DAY—AFTERNOON SESSION.

President Perkins called the meeting to order at 2:15 P.M., and asked for the

REPORT OF THE COMMITTEE ON UNIFORMITY OF METERS,

which, in the absence of the Chairman (Mr. C. H. Dickey), was read as follows by the Secretary:

Your Committee recommends that the Association should adopt as a standard differential pressure, at which to measure the capacity of meters, that of .3 of an inch water column pressure; the manufacturer to arrange to supply the gas company with 5 standard sizes of meters, which should have a capacity to measure gas at the previously mentioned differential pressure respectively at the following rates per hour: 100 cubic feet; 150 cubic feet; 300 cubic feet; 500 cubic feet; 750 cubic feet. For the convenient testing of the capacity of meters air may be used, proper corrections being made for the specific gravity of the measuring medium. The Committee recognizes the fact that different gases have different specific gravities, and recommends that the hourly capacities, as above stated, should be considered correct with gas having a specific gravity of .55.

We would also recommend that meters be designated by their cubic foot hourly capacity, at the standard differential .3 of an inch, water column pressure, and standard specific gravity of .55 for gas, and should be badged to show the hourly capacity in cubic feet.

We recommend that no larger sizes be specified until further data is available from the attempts to manufacture meters which are rational in dimensions in all their parts.

CHARLES H. DICKEY,
PAUL DOTY,
H. C. ABELL,
} Committee.

The President—Gentlemen, what is to be done with this report?

Mr. W. McDonald moved the adoption of the report. [Seconded.]

A Member amended by moving the report be received and filed.

The President—I think that would go without saying as the effect of the motion to adopt it.

Mr. A. S. Miller—What will the adoption of this report carry with it? Would it mean that the members agree to ask the meter manufacturers to change their system, or is it just a suggestion to the latter that they change their system?

The President—I think this is more of a suggestion to the manufacturers as a way to arrive at uniformity.

Mr. Horton—This is rather an important matter. Could we not have its consideration postponed, thus having a little time to think it over before we commit the Institute to a standard of this kind?

The President—That is for the Institute to determine.

Mr. W. McDonald—If any member of the Committee is here I think he should elucidate that a little before we adopt it, for it is an important matter. At the same time the subject was pretty well threshed over last year, when it was talked over pretty thoroughly, and as I understand it this report is made in accordance with the suggestion made a year ago.

The President—I do not think that any member of the Committee is here.

Mr. W. McDonald—Then, Mr. President, I withdraw my motion to adopt the report. I think the entire Association should have an opportunity to see it, and think it should be more fully discussed before we adopt it.

Mr. A. S. Miller—I move the report be printed and sent to the members of the Institute, and then that it be made an order of business for the next meeting. [Seconded.]

The President—Gentlemen, it is moved and seconded that this report be printed, that a copy be sent to each member, and that it be considered at a future meeting. Are there any remarks on that motion? All in favor of the motion will say "Aye." Contrary minds, "No." The motion is carried. We will now listen to the paper by Mr. J. M. Rusby, of Philadelphia, Pa., on

CONSUMERS' METERS: CAUSES OF VARIATION IN PROOF.

In the following is presented some information concerning the causing of erroneous registration and proof of dry gas meters, through decay

and "bleaching" or hardening of leather diaphragms, and other actions. Although the topics discussed are few in number, it is believed they cover some serious causes of meter registration troubles. This information has been derived from working experience, and also from rather extensive special investigation and experiment by the company with which the writer is connected. The information will be briefly presented under various proper headings.

Diaphragm Decay.—Where diaphragms are of such size, or so mounted that they continuously or frequently in their motion come in contact with any portion of the metal of the case, injury is almost certain to follow. In our experience a great number of meters which have become "non-register" or seriously slow, have revealed upon examination diaphragms ruined through this cause. The coating of tin is found to be removed from the sheet iron of the case at the point of contact, and corrosion is in progress. In many cases the particles of iron compound will be found to have impregnated the leather to very visible extent. The leather is found to be entirely rotten at this point, the particles of iron probably having contributed to this effect; in a great number of cases the leather remote from these points of contact will be found thoroughly sound and still capable of years of wear. Furthermore, an examination of the meter case metal at the point of contact reveals that the product of the corrosion of the iron stands out from the surface in small and sharp projections, which quickly rasp the leather entirely through. The precise cause of this action between the metal and leather we are unable to state. In either purchasing meters, or equipping them with new diaphragms, we therefore now have the latter of such size and so attached that this contact with the meter case is entirely avoided. It is already the common custom of makers, we believe, to insert a leather ring between the diaphragm leather and the metal rings to which they are attached. Attention was called to this danger from metal and leather contact by Mr. B. H. Spangenberg, in a paper read at the 1904 meeting of the American Gas Light Association, but is thought worthy of second mention here.

Meter diaphragms were formerly, and indeed may to some extent still be, attached to their rings by means of wire winding. It has been our experience that wire for this purpose is inferior to cord. An action probably somewhat similar to the above appears to take place between the wire and the leather, and many cases of breakage of the diaphragm at this point have resulted.

As to the deteriorating effect upon the leather of the various sulphur compounds and other impurities of gas, it seems certain that almost any one of them will have such serious effect if existing in considerable percentage. Ammonia is one of the worst; diaphragm leather dipped into ammonia solution is very quickly reduced to a gluey condition, and, on subsequent drying, is as brittle as paper; the same general tendency exists with gaseous ammonia. The small quantities of these constituents existing in a properly purified gas have, however, a very slow action indeed, as is shown by the long life of properly mounted diaphragms passing a good quality gas.

We can find little literature upon this subject. There has been some discussion of it by German gas engineers (see *Journal of Gas Lighting*, Sept. 27, '04; and *Gas World*, Sept. 10 and Oct. 8, '04), and as the result of their experiment and observation the following statements, among others, are made: Of the gas vapors, xylene is far the most powerful solvent for diaphragm oils, removing even the refractory oxidized oil compounds used on textile diaphragms. Among the gas vapors are liable to be some which, after deposition in a meter, become rancid or acidify through chemical change. Also "heavy hydrocarbons" gradually deposit a non-volatile, sticky compound on meter diaphragms, valves, etc. These papers and discussions concern themselves chiefly with the destruction of textile diaphragms which were largely in use, and had given much trouble by perforation, breakage, etc.; there is some discussion of leather diaphragms, however, which are pronounced superior to the textile ones.

It seems reasonable to suppose that a leather diaphragm if kept continually saturated with diaphragm oil, should deteriorate very slowly indeed from the action of these impurities, etc. Our experiments upon the action of ammonia on leather show a marked retardation of injury when the leather is thus thoroughly oil saturated.

Bleaching or Drying of Diaphragms.—In a paper presented by Mr. W. H. Gartley at this meeting are given the facts concerning condensation of vapors from illuminating gas with falling temperatures, and also plots showing the average yearly temperatures of the atmosphere and of the general distribution gas mains at Philadelphia. For the convenience of the reader these temperature curves[1] are here produced.

1. Fig. 1, [illegible]

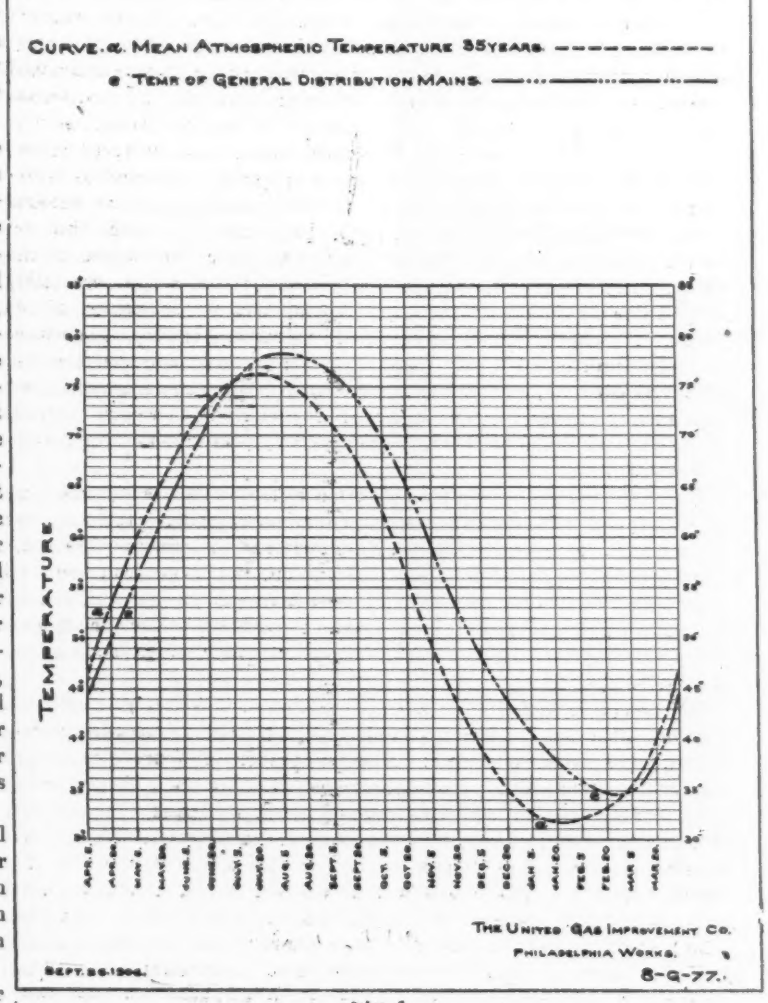


Fig. 1.

From these curves it will be seen that, from the middle of July to about the first of March, the average atmospheric temperature is below that of the mains, and consequently house meters which are so located as to experience about the atmospheric temperature will generally condense vapors from the gas which they receive from the street, provided that the gas is saturated with vapors at this street main temperature; this last condition will exist unless the gas has been subjected to very low temperature at the works before its discharge into the mains, or has passed through some exposed part of the mains. Furthermore, we have taken the trouble to place, and for the period of a full year frequently read, maximum and minimum recording thermometers immediately adjoining meters in a large number of buildings, these buildings so chosen that they represented about average conditions. We find that the average of all these minimum temperatures is higher than the temperature of the street mains during only the months of December, January, February, March, during which months buildings are experiencing their maximum heating, and, on the other hand, the temperature of the street mains is the lowest; during every one of the remaining months of the year the average meter appears to experience more or less frequent fall of temperature below that of the street mains, this condition existing to greatest extent during the fall months, as shown by the above temperature curves. On the other hand, the maximum temperatures are, especially during the winter months, far above those of street mains, producing a "superheated" or drying condition of the gas at the meter, and, in the case of many meters set in warm places, this condition will be long continued and severe.

During the spring, summer and fall months, therefore, there is a general tendency toward the frequent precipitation of vapors in the meters. It is worthy of note also that because of an affinity between the diaphragm oil and the vapors of the gas, absorption of the latter will occur to considerable extent, even if the temperature of the meter be somewhat above that of street mains; our experiments have shown this fact, and it has indeed been noted by other observers. These absorbed and condensed vapors are powerful solvents for the oil with which the diaphragms are saturated, when placed in the meter. In meters which experience to marked extent this absorption and condensation the dia-

phragm oil is, therefore, quickly thinned by the precipitated vapors and drained out of the leather, leaving the diaphragm saturated with merely the volatile condensed vapors from the gas. If, now, the temperature of the meter be from any cause raised so that the gas which it is passing becomes superheated, there is a rapid evaporation of these condensed vapors, and the diaphragm is soon left dry or bleached, and somewhat porous, stiff and shrunken. Its registration is thereby affected, as will be shown in the following; and moreover, while thus deprived of the protection of its diaphragm oil the leather is probably subject to injurious action by water vapor and the minute quantities of the various impurities and oxygen in the gas. The diaphragm oil, once thus removed from the diaphragms and distributed over the bottom of the meter, will not thereafter be again absorbed by the leather, especially if the latter (as should be the case) stands clear of the bottom of the meter. During the remaining period of its service, therefore, the leather will be unprotected by any diaphragm oil; it may again become wet from deposited vapors, but will immediately dry on any subsequent rise of temperature, and the registration of the meter will therefore vary, as will be shown in the following, according to i's condition of dryness or dampness.

Much annoyance having been experienced from this bleaching of diaphragms, and the foregoing general explanation being arrived at, we have made very considerable special experiment to ascertain the exact facts concerning its effect upon registration, and have also expended very considerable time and money in endeavoring to find a means of maintaining the diaphragm in a constant condition under the continually varying conditions of vapor deposition and drying above mentioned.

Our special experiments upon the bleaching of diaphragms and consequent effect upon meter registration, alluded to in the preceding paragraph, were made as follows: A large number of boxes containing water were prepared in which the meters could be set. The water in these boxes was artificially cooled, and the gas passing through the meters was thereby brought to any desired temperature. Before admission to these meters the gas supply was cooled and scrubbed in external vessels to known temperatures relatively to the street mains, so that its condition of vapor saturation was actually known. Gas was then passed through the meters in large quantity and for considerable periods, the temperature of the meter being successively lower and higher than the temperature of the gas at its entrance into the meter, with consequent first condensation of vapors in the meter and washing off of the diaphragm oils, and a succeeding evaporation of the condensed vapors, producing a drying or bleaching of the diaphragm. The meter was removed, drained and proved at the conclusion of each low temperature period and each high temperature period. The following curve, which represents the average record of one lot of three meters, is generally typical of the provings of such meters.[1]

8 per cent. fast, as shown at the close of the curve. Even in other meters which were constantly kept at a temperature equal to or slightly above that of the incoming gas, and in which, therefore, the latter was slightly superheated, the absorptive effect of the heavy diaphragm oil upon the vapors was ultimately such as to cause the same bleaching effects. The meters were in great part provided with glass fronts through which continually the appearance of the diaphragms could be observed, and under the foregoing treatment they all showed bleaching; the passage of 2,000 to 3,000 cubic feet of gas with a moderately low temperature of meter is sufficient to produce this effect.

These experiments, therefore, fully reproduce the practical phenomena of bleaching and drying of diaphragms and explain their cause. It is evident, as is confirmed by numerous cases in our practice, that meters which have in everyday work been first subjected to temperatures which remove the diaphragm oil, and are subsequently, through house heating or rise of atmospheric temperature, subjected to warming and drying, are liable to register seriously fast. Moreover, a meter removed in this condition and proved and adjusted to correct registration with its diaphragms bleached, is liable to be set under conditions such that its diaphragms again become damp from vapors, when it will register slow; also, the leather in this condition, being now unprotected by diaphragm oils, is probably much more liable to gradual decay.

Evidently, therefore, to insure constancy of registration and protection of the diaphragm leather, the latter must either be so prepared that its fiber shall not be acted upon by the gas and water vapors, or else the oil or other diaphragm saturating compound must be rendered capable of continually saturating the leather even while acted upon by these vapors.

Although nearly all of our efforts to attain the foregoing result were failures, moreover, the method finally adopted for trial is so simple as to warrant very little description; nevertheless a few brief remarks may contain something of interest.

Our first efforts were directed toward the finding of a compound which would not be acted upon by the gas vapors, although we were aware at the outset that this would be a difficult matter. A very great number of oils were tried—we scarcely hoped to find one which in its natural condition would resist the vapors, the latter being such powerful solvents—but we hoped we might at least find one which, by special preparation or method of application to the leather, could be made fairly refractory or would render the fiber of the leather less liable to change of form. With some of these oils we had no success whatever under any condition. Certain of the vegetable oils, especially boiled linseed, which is the substance chiefly employed in the preparing of the textile diaphragms which have heretofore been used abroad, were rendered somewhat refractory to the vapors when allowed to partially oxidize after their application to the diaphragm and before the latter is placed in the meter; even then they would gradually yield to the action

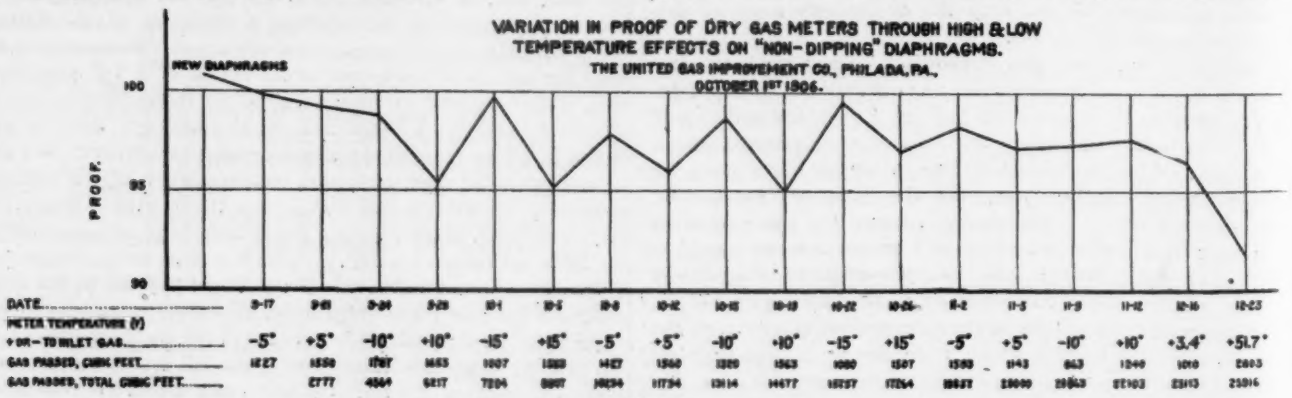

VARIATION IN PROOF OF DRY GAS METERS THROUGH HIGH & LOW TEMPERATURE EFFECTS ON "NON-DIPPING" DIAPHRAGMS.
THE UNITED GAS IMPROVEMENT CO., PHILADA, PA.,
OCTOBER 1ST 1906.
NEW DIAPHRAGMS
100
95
90
PROOF.
DATE
METER TEMPERATURE (F)
+ OR - TO INLET GAS
GAS PASSED, CUBIC FEET
GAS PASSED, TOTAL CUBIC FEET
-5° +5° -10° +10° -15° +15° -5° +5° -10° +10° -15° +15° -5° +5° -10° +10° +3.4° +51.7°

Fig. 2.

The + and — temperature figures indicate that the meters were proved immediately after passing a quantity of gas this number of degrees above or below the temperature of the gas entering the meters, with consequent condensation of vapor or drying of diaphragm. Thus, under date of October 5th on the chart, the meters were proved immediately after passing 1,583 cubic feet of gas which in its passage through the meters was 15° above its temperature at entrance, and consequently there had been a drying effect upon the diaphragms. It will be observed from the chart that the meters most frequently run fast after drying (plus period) and slow after wetting (minus period) of the diaphragms; this was the general tendency of all meters tested. Upon raising the temperature of the meters to an excess of 51.7°, they ran over

1. See Fig. 2.

of the vapors, however, or under drying action would harden so as to impede the motion of the meter. Various combinations of these oils were tried and various methods of application to the diaphragm, including heating in application and careful seasoning. "Soaps" or greases saponified together with iron and aluminum were also tried without success. Shrinking the diaphragms, by immersing them in water and then drying before the application of the diaphragm oil, was tried. Diaphragms were lightly coated with collodion, which is quite refractory to the vapors, after the application of diaphragm oil, but the bleaching of the diaphragm through this collodion film quite readily took place. "Flexible compound," which is probably a boiled linseed oil preparation, was tried, but behaved largely like linseed oil.

Many materials other than the ordinary sheepskin were also tried

among them the following: Both plain and glazed kid, which makes an excellent leather, being firm and non-porous and changing its shape less than sheepskin; it is rather expensive, however, and in view of later developments seems unnecessary of adoption; "chrome" tanned, and other special tannings of sheepskin; very thin artificial leathers, which become too brittle; various special preparations of sheet rubber. "Dichtungsgummi," a German sheet packing which has nearly the flexibility and elasticity of pure sheet rubber; it is remarkably refractory to the ordinary light solvent oils, showing almost no tendency to dissolve under their action, but it absorbed sufficient of the vapors to expand considerably, which rendered it unsuitable for diaphragm use. Silk, linen and muslin coated with oxidized linseed oil and flexible compound; these being thin would work well even with a coating of oxidized oil, but this latter gradually yielded to the vapors, as has been found by foreign users of such diaphragms.

Dozens of diaphragms prepared by the foregoing methods were carefully tried in our experimental appliances, none of them proving at all satisfactory. Efforts along the foregoing lines having been unsuccessful, other means were sought. It occurred to the experimenter that possibly the capillary action of the leather could be made use of, and investigations were made in this direction.

These experiments showed the diaphragm leather to possess unexpectedly high capillarity. This varied with different oils, but it was found that a light machine oil would in 3 or 4 days rise 12 or 13 inches in strips of leather, which is the full height of an ordinary 10-light meter diaphragm. It will ultimately rise to a height of 28 to 30 inches, but at a much slower rate. In diaphragms, because of their form, this absorption is less rapid than in these strips, but nevertheless a new and entirely dry 10-light diaphragm in the meter will become thoroughly saturated from top to bottom through this capillary in from 8 to 10 days. It is evident, therefore, that if sufficient oil be placed in the bottom of the meter for the diaphragm to continually slightly dip into it, the supply of oil upon the diaphragm will be continually quickly replenished even if temporarily removed in part by condensed gas vapors. This is fully supported by the result of our practical experience with a large number of meters mentioned below, it being very rarely the case that a diaphragm removed from the most trying practical service is not found saturated with oil completely to the top. Moreover, even while the oil is thus temporarily partly removed, the leather will be wet with condensed gas vapors, and will, therefore, tend to preserve its dimensions and uniform registration.

Experimental meters thus equipped having shown very promising behavior, about 35,000 meters have been thus fitted and put into use during the last 15 months at Philadelphia.

A comparison of the proofs of these "dipping" meters with the proofs of the ordinary non-dipping meters, after removal of each from service, invariably shows a superiority in the former. Even ordinary meters which had come from the shop within these 15 months, and whose diaphragms are, therefore, in equally good condition with those of dipping meters, show an inferior performance; 50 of each kind of such comparatively new diaphragm meters, recently proved after nearly a year's work, showed an average net proof of .04 per cent. fast in the case of the dipping meters and .8 per cent. fast in the non-dipping. A comparison of the proofs of all meters of each kind proved from Jan. 1, '06 to date is far more favorable to the dipping meters, the range of fast and slow registration in these being less than half of that existing in the non-dipping meters. In this latter comparison it is natural that the non-dipping meters should show inferior behavior to the dipping, because the latter had newer diaphragms; nevertheless, this is the comparison, we believe, which shows most correctly ultimate conditions as we have good reason to expect that the condition of diaphragms in the dipping meters will for very long period remain practically the same as when new, whereas the non-dipping diaphragms are certain to experience injury.

While longer trial is necessary to completely establish the excellence of this method in every respect, we seem from these results to have every reason to expect a much improved behavior on the part of the dipping meters. The mere fact that on inspection dipping diaphragms are almost invariably found after service to be thoroughly saturated with oil, seems to render it positive that serious cases of bleaching will no longer exist, and also that the diaphragm leather will be much less liable to decay and breakage; consequently, the cases of abnormal slow and fast registration, which are productive of so much loss to the company or dissatisfaction to the consumer, will be avoided, as well as much of the considerable expenditure ordinarily required for meter adjustment and repair.

This dipping oil, even when newly placed in a meter, has no appreciable effect upon candle power through absorption of gas vapors, this being ascertained by direct experiment with meters subjected to even very low temperatures. The oil being upon the bottom of the meter comes in contact with but little of the gas at a time, and any absorption is exceedingly gradual and small.

The oil which we are trying is a moderately light, pure machine oil from which has been removed all traces of whatever acids have been used in its refining. We have chosen this oil chiefly because it is at ordinary temperatures almost entirely inert and unchangeable chemically, having no tendency to become viscous by slow oxidation, or to slowly form acid or other compounds, which is probably not true of vegetable or animal oils. There seems, therefore, no possibility of its having, even ultimately, any injurious effect on the leather. It is also cheap, the cost of the quantity used in a 5-light meter being only 3 cents or 4 cents. It is also absorbed by the diaphragms slightly more readily than any other oil which we have tried. In its pure condition it has a solidifying point of about 35° F., which is a emperature reached by few meters; moreover, the absorption of even a very small amount of gas vapors by this oil renders it fluid at 23° F., and such vapor absorption occurs after the meter has been in use a very short time. Sufficient oil is placed in the meter to immerse about $\frac{5}{8}$ inch of the bottom of the diaphragm, the latter being previously saturated with the same oil. The quantity of oil required for an ordinary 5-light meter is 10 ounces in each compartment, or a total of 20 ounces.

It is necessary, as is usual in the ordinary oiling of diaphragms, to let them stand or "season" for a week or 10 days after the application of the oil, before placing in the meter and adjusting the latter; it is better still that the meter be fully equipped with its dipping oil and thus stand before adjustment. This treatment seems, from our experience, to be necessary in order that the leather may experience full saturation and assume final shape.

Effect of Friction and Evaporation of Meter Condensation.—In the course of our work questions have arisen which led to the following experiments. The investigation suggested by them we have been as yet unable to make, and the results are quoted simply as general information which may lead to further confirming experiment by others.

Friction of mechanism appears capable of causing very considerable variation in registration, and care in the packing of stuffing boxes and neat fitting of the links, etc., is worthy of attention. The following experiment is quoted: To the crank rod of a 100 light meter was attached a 3¼-inch diameter pulley, upon the perimeter of which was wound a cord which was acted upon by weights, these being so supplied as to successively retard or assist the motion of the meter. A weight of 1 pound caused the meter to register 8 per cent. slow when retarding the motion of the meter, and nearly 7 per cent. fast when assisting its motion. It is probably that the chief effect of friction is to slightly change the length of stroke where there is any play of mechanism, and even slight change of this kind can quite appreciably affect registration. This friction effect would probably, therefore, differ in every meter. This one experiment is cited simply to show general effects. It appears to indicate, for instance, that a meter adjusted with tight or binding mechanism, and which subsequently eases up through wear, will run fast; this agrees with our practical experience.

If a meter contains condensed gas vapors it may still register gas about correctly, the latter being generally saturated with these vapors and having no tendency to pick up the condensation. In the proving of such a meter with air, however, the air readily absorbs condensation, with consequent increase in volume, and the meter is liable, therefore, even if measuring correctly, to apparently run fast. The action in this case is quite complex. The vapor formed will tend to increase the volume of the air, while the simultaneous lowering of temperature through this evaporation will tend to diminish it; moreover these effects will take place gradually while the air is being received and discharged by the diaphragms, and both will be affected by the rate of passage of air through the meter. To ascertain approximately the net result of these various effects in meter proving, the following experiment was made: A number of meters containing meter condensation were proved. The air discharged from the meters was run into another prover and its volume noted, and simultaneously the temperature of the air at the exit from the meter was observed. The meters and all parts of the apparatus were at the beginning of proof at one temperature. On four successive proofs, passing 8 cubic feet of air on each proof, the average increase in volume of the discharged air as measured in the outlet prover at the constant room temperature varied from 2.9 per cent. on the first proof to 1.65 per cent. on the fourth proof. The temperature of the air was lowered 7° in each proof in passing through the meter. The net result of these opposed effects was to cause the me

ters to register from 1 per cent. to 1½ per cent. fast on the first proof, the error being, however, small after this first proof and diminishing to almost zero on the last. It seems, therefore, that although the maximum error is not very serious, the passage of a few feet of air through a meter before taking its proof tends towards greater accuracy in showing the actual displacement or registration of the meter.

Discussion.

The President—We have listened to a most admirable paper. It almost amounts to a text-book on the meter question. It is before you for discussion. Mr. Rusby would like to answer all questions that you wish to ask him.

Mr. A. S. Miller—This paper elucidates in a very clear way a question which I believe has worried at some time about all the people in the gas business, as well as a number of the meter makers. We have all been worried at what is commonly termed "bleachers," more so I believe in the East since we began using Texas oil in making water gas as that seems to absorb the diaphragm oils more readily than straight coal gas or than water gas made from Pennsylvania or Ohio oils. There is nothing I can say, Mr. President, that would add anything to this matter. I would like to extend to Mr. Rusby my thanks for the very careful manner in which this is worked up. It will be of immense use to us.

Mr. T. D. Miller—I would like to ask Mr. Rusby if this mineral oil referred to is the only one that he found he could use that has this tendency to saturate the diaphragm through capillarity.

Mr. Rusby—Other oils will saturate the diaphragms through capillarity. As stated in my paper, however, our reasons for using this particular mineral oil are that it is chemically inert and not liable to decomposition at ordinary temperatures, and is cheap. It must be free from any acid used in refining.

A Member—What kind of oil was it?

Mr. Rusby—An ordinary light, pure mineral machine oil.

Mr. T. D. Miller—We had an experience with the bleaching of diaphragm leathers by the gas supplied through our river pipe to Algiers, which is a high pressure service. We first installed for this service wet meters, but soon discovered the gas was so dry that the wet meters required filling about twice a week. We then removed the wet meters and installed dry ones, but in the course of a few months we found the leathers bleached so badly that they would pass gas like a sieve. This became a very serious question with us, and I hope the suggestions of Mr. Rusby will aid us very materially in treating this character of trouble. At the time we used a mixture of oils charged heavily with graphite, which we introduced through the valves and allowed to soak on the inside of the leathers, after which the oil was drained off and the meter put back into service, which gave us fairly good results. If the method of dipping the leathers into oil, while in service, will solve the problem, so far as distribution of compressed gas is concerned, Mr. Rusby has undoubtedly given us a valuable paper.

The President—Is there anything further, gentlemen? There is a call for Mr. Spangenberg.

Mr. Spangerberg—I was not present at the reading of the paper, but can verify everything that Mr. Rusby said in it. It is a matter with which I have had some experience. This method of wetting the diaphragms in these dipping meters with oil is certainly a good solution of a troublesome problem.

Mr. K. M. Mitchell—I would like to ask if Mr. Rusby can tell us where this oil is to be obtained, and about what it costs per gallon?

Mr. Rusby—It is merely an ordinary good quality light machine oil, such as can be obtained anywhere. I am sorry I cannot at the moment state its specific gravity. Its cost is about 15 cents a gallon. Our reasons for using it are somewhat theoretical, but appear good; our experience to date has not been very lengthy, but has been quite favorable. If we find out anything to the contrary, we will be glad to make it known.

Mr. A. S. Miller—Mr. Rusby, you know that with some gas men it has always been a sort of superstition that petroleum was bad for leather. I would like to know how long your experience in using petroleum for this purpose has run, and whether you found any tendency to injure the leather.

Mr. Rusby—We have been using it in some meters for about 8 months. This, of course, in comparison with the length of life that is expected of a meter diaphragm, is a very short time. We cannot say positively that the oil will not have an injurious action upon the leather, but we cannot see any reason that it should.

Mr. A. S. Miller—I see no reason why it should not be entirely satisfactory, but it has been one of my superstitions, which I seem to have grown up with the belief was a fact.

Mr. Rusby—I doubt that any injury will result, but only further experience will determine this. We will be very glad to hereafter make known to the Association, or to any single inquirer, the results of our further experience.

Mr. T. D. Miller—Has Mr. Rusby tried to use paraffine on any of these meters?

Mr. Rusby—I think we did. We tried this and a large number of similar substances, but all were cut by the gas vapors.

Mr. A. S. Miller—As my neighbor has just said, this is so new, and this whole subject is following such a different line from anything which was ever followed before, that I feel it cannot be discussed here in the way it deserves. I have not the slightest doubt that everything will be found just exactly as Mr. Rusby states, but as he states, he is simply reporting the results of some preliminary experiments, and it will take time to say whether he is working on the right track. From my own point of view, I should say there was every indication that he has started work on the right track, and on a track that is going to be of very great benefit to the gas industry. This matter of meters being out of proof has been a more serious one in later years than in previous ones. I wish, therefore, to move a hearty vote of thanks to Mr. Rusby for the benefit he has given us of the tremendous amount of work he has done. [Seconded.]

Mr. Shelton—Mr. President, before that motion is put I would like to ask that opportunity of discussion be extended to a visitor who has come a long distance and whom we have the pleasure of having with us to-day. He may have some thoughts on this meter subject that would be very instructive for us to hear. I refer to Mr. Thomas G. Marsh, of England, who has traveled some 4,000 miles to be with us. While primarily not here on business, he has nevertheless timed his visit so as to be able to be present at this first meeting of the American Gas Institute. I think the members of the Institute would be very glad to have him say any word which he may wish, and to give us a chance to welcome him. We know that when any of us go abroad—first and last, a good many of us have had that opportunity—and when we have had the good fortune to be present at some of the English meetings we have both individually and in our Association capacity been most cordially welcomed; so I think I scarcely need to say it is our disposition that we should be second to no one in extending courtesies and a welcome to any accredited, capable, successful gas man, especially one coming such a long distance. Mr. Marsh has been identified with the meter interests for many years. He is one of the authorities on such questions in England, and we have good fortune in having him with us. I do not know whether he has perused this paper or is in a position to make accurate criticism upon anything that Mr. Rusby has said as yet, but I certainly believe I am right in saying we would be glad to have Mr. Marsh say any word that he may see fit and give us any thought he may have on the discussion of this particular question. [Applause.]

The President—It is with very considerable pleasure that I offer Mr. Marsh the courtesy of the floor, and in doing so I am sure I voice the sentiment of all the members of the Institute. We should be very much pleased to hear from Mr. Marsh.

Mr. Thomas G. Marsh, Manchester, England—Mr. President and brother gas men, I thank you very heartily for what you have said with regard to my fellow countrymen. I have only one regret, now that I have come to America, and it is, this being my first visit, that I did not come over here and see you many years ago. If I had, in all probability I might have become as much an American as the most of you that I see around me. Before I attempt in any way to criticize or speak upon the paper, which, I am sorry to say, I have not had the opportunity to glance over until I came into this room, I must first pay what I consider is a debt due to you. When I came over here I was received in the most broad-minded and generous manner. As a gas man I felt desirous of seeing what was being done in this country, and in the very short time that I have been here I have been received, and welcomed, and shown over various works and plants. At times I might have been a little dense in comprehension, but very great care has been given to make me fully understand the matter. And when I go back to England I shall be able to say that our brother gas men over the water are most broad-minded, in that in what they are doing they are willing to show it to a stranger, and I shall say to them emphatically that we in England ought to act in a reciprocal manner. [Applause.] Now, Mr. President, I am sure I cannot add much to the facts given in the paper. If I can say a few words, however, about one or two points I shall be only too glad to do so. Your great, your mighty country, has been blessed by Providence with many things

which we have not ourselves. We have in my own country an amplitude of area. We have an amplitude of coal, which has helped to develop my country, and to bring it up to the proud position that it holds as being one of the smallest in area and yet certainly one of the strongest in the word. That has come about very largely, perhaps, through the energy of the people, but more so from the country having been blessed with an ample amount of coal, an ample amount of minerals, and to help matters on we have had very fair transport arrangements. But when I came over here I find that you not only have coal, but that you have minerals, and that you have natural gas, which comes upward from the earth with but little comparative cost to obtain it, and which gives you, I might say, millions of horse power in addition with which to light and otherwise use in the many communities of this country where I understand it is found. When I saw that I said, "That is one thing that we have not in my country." And when I came west and saw the Falls of Niagara, I saw what I called God's grand art there, and yet beside the Falls I saw man's great art also. I saw the mighty power of those Falls harnessed and made use of for the purposes of man; harnessed and used for the purpose, I noticed, for one thing, of making carbide of calcium. Now that is a material which we cannot in any way make in England. We cannot possibly get the power at the price that it is given to you. But having all these helps I find that the men are not slothful as we find in many countries which are fruitful, but that they have the energy to make use of these natural advantages, and that they make the very best use of them. When I go among you and meet you, and while I stand in this room I feel at home. I am among gas men. When I have been in the country on a motor drive, or anything else, and I come within the familiar odor of a gas works it made me feel just like getting home. When I come among you I feel the same. Now I will not take up much of your time to speak about the paper because I am sure that you have a lot of other business to do. I will refer briefly, however, to its matter or subject. I believe that one of the reasons why, of late years, there has been a falling off, perhaps, in the quality of meters when they are taken out as compared with what they were in passed times has been in consequence of the tremendous increase in demand. I am not speaking particularly of your own country in that regard, for I have noticed the same thing in my own. Now when in England the "penny-in-the-slot" or "nickel-in-the-slot" meter came into vogue and with which my associate, Mr. Thorp, and I had the honor to be identified as inventors, and which we have had the honor to be the first to introduce when that first came into use in England, the meter business was only a small matter of 100 or 150 per week, but that suddenly jumped up to many thousands. In fact, in the experience of my own concern it jumped up from a mere matter of perhaps 150 to 200 hands to a matter of something between 2,000 and 3,000 hands. Now the work is equally well done. The meter is well finished, but the diaphragms have not had the time to pickle that they should have had. I believe that the diaphragm of the gas meter before it is put in should certainly be allowed to absorb the oil, and that it should be left in store for a matter of 6 or 7 months before it is put into the meter. Now, of course, we can understand that where the demand has increased so greatly that is a very difficult matter to do. In fact, it is almost impossible. But if a gas man could prepare himself so as to have a very large number of diaphragms ready pickled, and not use them until they have been in pickle at least 6 months, I think one of the very serious drawbacks which now exist would be removed. Then another matter. We should have a meter that is without seams. That is a very important matter in connection with the diaphragm. I agree with the writer of the paper that it is a mistake to wire the diaphragms. They ought to be fastened with stiff cord, but I am also of the opinion that the diaphragm should not have a seam in it. It should not be sewn. It should be cut out in one piece, and it should be so put into the meter that the leather cannot under any circumstances touch the case or any part of the meter. If that is done then I see no reason why when the meter comes out there should be any defect that occurs from the diaphragm. On the other hand, a very serious matter in meters is the sliding valve. Ordinarily I have but little regard for the sliding valve at all. There is in many kinds of gas a deposit of oil that gets on these valves. They stick. Much trouble is caused that way. Another thing is this: Occasionally where meters are fixed, possibly not so often now as in the early days, a certain amount of dirt or deposit comes out of the pipe in the building and gets into the meters, and some of it gradually finds its way into the seat of the operation of the valve, with the consequence that that valve becomes more or less grooved, with the result that the registration of the meter is very much affected. I am sorry, gentlemen, I have not the opportunity of going fully into this subject. I see that it is mentioned in the paper, although I did not read it fully, as to whether the diaphragm should not be constantly absorbing the oil by capillary attraction. I am very much afraid myself that it would not be absorbed as equally and as fully as one might hope. I believe that one portion of the diaphragm would probably absorb more than the other. Of course, I have not had experience with it. I have been out of the consumers' type of meter business for some 10 or 12 years, except for the interest that I have in "Meters Limited," with which concern I remain in personal connection as to stock holding, but take very little interest in the management. But if I, myself, were to purchase dry meters, I should certainly specify that the diaphragms have no seams in them. Now, gentlemen, no man can but feel highly honored at the manner in which you have received me, and which I fully expected after the generous, open-hearted and broad-minded manner in which I have been received since I came into the country. Gentlemen, I cannot say what I feel, but I think you understand what I desire to tell you, and how much I have been impressed with my reception. [Applause.]

The President—It has been moved and seconded that a hearty vote of thanks be extended to Mr. Rusby for his valuable paper. All in favor of that motion say "Aye." Contrary minds will signify by the usual sign. [Adopted.]

[To be Continued.]

(Continued from page 849.)

FOURTEENTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD IN SAN FRANCISCO, CAL., SEPTEMBER 18, 19 AND 20, 1906.

FIRST DAY—AFTERNOON SESSION.

The Acting President—Perhaps we had better proceed to the next paper (that by Mr. L. E. Reynolds, of San Francisco) on

HOW ELECTRICITY WAS SERVED TO CONSUMERS AND STREET CAR LINES BY THE SAN FRANCISCO GAS AND ELECTRIC COMPANY AFTER THE FIRE,

which was read as follows:

In order to get a clear idea as to how San Francisco was supplied with light and power to consumers and street car lines after the fire of April 18th, 19th and 20th, it will first be necessary to go over the normal condition of its distributing system as it exisited previous to this time. It is as follows:

The downtown section was furnished by a complete Edison system of 3-wire, 220-volt, direct-current tube for lights and power. This was composed of about 130,000 feet of main on standard Edison tube and 95,000 feet of Edison tube feeders. The mains were placed on either side of the street so that services were tapped off direct to the building. These mains terminated in fused junction boxes at street intersection. The feeders extended fan-like from the station to various junction boxes, and did not directly supply any consumers. There was also a complete system of alternating current mains of 220-volt, 2ϕ-4 wire, supplied by subway transformers which in turn were connected to 2,200-volt feeders. The alternating current mains were installed by the Independent Electric Light and Power Company, and are usually parallel with the Edison system. This system contains approximately 160,000 feet of conduit, ranging from 4 to 16 ducts. There are also 1,050 manholes, which contain junction boxes, fuse boxes and subway transformers. Within this conduit system there are installed 102,500 feet of 11,000-volt 3-conductor 3ϕ cable, and 10,000 feet of 4,500-volt, 3-conductor, 3ϕ cable; 75,000 feet of 2,200-volt, 4-conductor, 2ϕ cable; 130,000 feet of 220-volt, 2ϕ-4-conductor cable; 240,000 feet of miscellaneous cable, supplying service, special installation, direct current cables in conduit system, etc. Outside the fire limits the distribution is carried on poles in the usual manner, having installed approximately 10,000 poles and 1,500 miles of wire.

The steam plant known as "Station A," is located at 23d and Georgia, and contains about 30,000-horse power of steam plant capacity. This plant is also connected by 2 lines to Martin power house, which is a gas-engine generating station, having approximately 16,000-horse power capacity. Two lines extend south from Martin power house and connect with water power system of California Gas and Electric Corporation. The capacity of lines between Martin power house and "Station A" is 12,000-horse power. The larger portion of this energy was transmitted directly to central sub-station, on Jessie street between 3d and 4th, having a capacity of 3,800 kilowatts in motor generator sets, 2,000-

horse power in steam engines, and 1,500 kilowatts in storage batteries, 3,000 horse power in steam generating apparatus having been destroyed February 22d by fire.

Sub-station No. 1 was at Fern avenue, between Polk and Larkin. It contained 500 kilowatts in motor generators and 250 kilowatts of storage batteries feeding directly into Edison system.

Sub-station No. 2 was on Minna, between 11th and 12th, containing 500 kilowatts in motor generators and 250 kilowatts storage batteries.

Sub-station No. 3 was on Pacific, between Dupont and Stockton, containing 500 kilowatts in motor generators and 250 kilowatts of storage batteries; also, one 50-light arc transformer.

Sub-station No. 4 was an alternating current station, on 8th street, between Mission and Howard. This station was used as a switching station between "Station A" and the other alternating current sub-station. It contained 2,000 kilowatt capacity of 11,000-volt stepdown transformers, also arc transformer for taking care of 800 city arcs, one 400-kilowatt rotary converter, 550 volts, direct current, for delivering energy to the street railway. Also one 250-kilowatt rotary converter, 220 volts, delivering energy into Edison system. This sub-station received its energy from 4 underground 11,000-volt, 3 conductor cables from "Station A." Also, one overhead line of 3-conductor, as far as 7th and Folsom, thence underground for 3 blocks, and after passing through switches goes directly to central sub-station. There is also an overhead line from "Station A" as far as 7th and Folsom, thence underground directly to central station. From sub-station No. 4 there were 2 lines to each of the other alternating current stations, which were located as follows:

Sub-station No. 5, Mission, between New Montgomery and 3d, containing 2,000 kilowatts capacity of 11,000-volt to 2,220-volt stepdown transformers, and 250 kilowatts in motor generator sets delivering direct current energy into Edison system. One 400-kilowatt, 500-volt, rotary converter capable of supplying energy to United Railroads. This station was supplied from two 11,000-volt cables from sub-station No. 4.

Sub-station No. 6 was located on Sacramento, between Sansome and Montgomery, containing 1,500 kilowatts capacity of 11,000 volt to 2,200-volt, stepdown transformers, and one 250-kilowatt rotary converter, delivering 220 volt energy into Edison system. This station was supplied by two 11,000-volt cables from sub-station No. 4.

Sub-station No. 7, on Hyde, between Golden Gate avenue and McAllister, contained 2,500 kilowatts capacity of 11,000-volt to 2,200-volt stepdown transformers, receiving its energy from two 11,000-volt cables from sub-station No. 4.

Sub-station No. 8 is at Townsend street, between 2d and 3d, and contains 850 kilowatts capacity in motor generator sets, delivering energy into Edison system.

There is also a Kansas street station, on Kansas near Division, which was used as a switching station, receiving water power energy and also steam energy, and delivering same to sub-stations 1, 2, 3 and 8, as these were all fed by overhead lines.

The earthquake and fire did not even crack the walls or do any damage at "Station A," except 1 transformer burnout. The machine foundations for this station were made by blasting out the solid rock, and then building up on large masses of concrete. The walls were of brick laid in cement mortar, and same are as good as before the earthquake.

Central station had its steam plant destroyed, also all the wiring and switchboards, on February 22d of this year, so that the subway, with its wires, also switchboard, were only temporary, being installed as quickly as possible after the other fire. The sub-station portion of this building was fireproof, and, except for the fact that a 6 story brick wall fell on the roof, caving in the roof of the running motor generator room, the station would not have suffered much damage. The high tension switching apparatus, containing large quantities of oil, did not burn. Office furniture and records of Superintendent of Stations, also locker room had store room for supplies, remained intact and did not burn, although in this vicinity the fire was as hot as anywhere in the burned district. This sub-station was composed of brick exterior with wire glass windows and slate roof. The motor generator sets were damaged after the roof had been broken down with large masses of brick and steel from the adjoining building, and a crane, which was used for the installation of motor generators, was brought down on top of them.

Sub-stations 2, 3, 4, 5, 6 and 7 were completely destroyed, so that we had no further use for them. Sub-station No. 8 was saved by the exceptionally good work done by its operator, Mr. Fay. A steam boiler was used in the rear of sub-station No. 8 to pump oil from the Bay to central station, also circulating water. A fire pump was installed in the basement of "B" station, which was just across the street from sub-station No. 8. Mr. Fay kept this fire pump going, pumping salt water on surrounding buildings until "B" station was ready to fall. He then left pump going and worked hose, keeping his own station and several warehouses nearby from being destroyed. The station was not damaged at all.

The 4 underground cables from "Station A" to sub-station No. 4 were so badly wrecked by the earthquake and gas explosion that they were out of commission some 10 or 12 days. The overhead lines were burned down for 4 blocks. The underground extension of these lines was so badly damaged that the conduit and manholes had to be reconstructed in many places. Along 7th street, from Mission to Howard, the earth was displaced from 5 to 8 feet in a direction lengthwise to conduit. This caused some of the manholes to crush like egg shells, although they were 12-inch concrete walls. The conduit was pulled apart at other places, and cables were wrenched and torn from their boxes, and in some cases pulled apart between manholes, so that these breaks were not discovered until after we had tested with full voltage. Five different attempts were made before we succeeded in establishing connections between "Station A" and central station. The overhead line was replaced on 7th street for 4 blocks. A temporary overhead line was built from Kansas street station to sub-station No. 8.

The underground Edison system had services tapped off into the basements, which had been ruined, so that every joint had to be dug up and cleared before service could be re-established on the main itself. Fortunately for the public, it was not necessary to wait to clear all of these mains, as it will probably be several months before we can open the street because of piles of *debris* over them. Since all of our alternating sub-stations with their apparatus have been destroyed, and also since we could not re-establish connection with our Edison mains completely for some months, it was decided to abandon the alternating current system of distribution for underground section and use the cables for direct current. We, therefore, had service where same was needed before the building stopped smoking, and light was established in the banks and those buildings which were not burned, as soon as it was needed. Each block of main had to be gone over, however, removing all services therefrom and tested out carefully before the main could be used.

In addition to the sub-station mentioned above, during heavy load last winter, we found it necessary to build an overhead cross-town line from "Station A" over Mariposa and 17th street, tapping Folsom and Mission street, running west as far as Stanyan, and thence north to Fulton, thence west to 1st avenue, thence north to Washington street. The function of this line was to boost up the outer end of feeders so as to keep a uniform potential at long distances from sub-stations. Pole transformers were installed on this line, transforming directly from 11,000 volts to 2,200 volts as load required. Two 750-kilowatt stepdown transformers were installed at 17th street, near Folsom, which take care of all of the unburned section of the Mission for power and light. One transformer for 200 city arcs was also installed in temporary station, and a 50-kilowatt light transformer which was formerly at sub-station No. 3 was repaired and installed here. Thus all except about 100 of the street lights in the unburned section of the Mission were provided for. These had to remain out until we could get apparatus for their control.

The Western Addition was supplied by two 750 kilowatt transformers placed on the sidewalk at 1st avenue, near Point Lobos. Here, also, was placed a transformer for 200 city arcs. This provided for all the city arcs in the Western Addition, with the exception of 100 which were purposely scattered.

On the morning of the 18th, as the fire was approaching the storeroom where all distribution supplies were maintained, we succeeded in removing 1 buggy full and 1 automobile full of linemen's tools, tape, solder and such small supplies as we could get hold of quickly to a place of safety. As soon as the men had taken care of their families temporarily, the Company established a commissary department, setting aside 1 wagon and 2 soldiers to collect food to provide for the men and their families. It was necessary in order to keep the men to care for them in this way. A mess house was established and they were boarded until better accommodations could be obtained. We thus kept a large force of men busy when we needed them most. Regular work was organized on Saturday, the third day after the earthquake, and 100 city arcs were ready to burn on Saturday night and 200 more were ready Sunday night, and so on the work progressed. On Monday many of the houses were lighted in the Western Addition. From then the

work was carried on very rapidly with constantly increasing speed. We were also very busy, as soon as we could get teams, picking up our copper which had fallen down from burned lines. We regained about $60,000 worth of this metal from the streets. Every house in the unburned portion of the city which had previously been lighted by electricity had to be disconnected from the main before current could be turned on at all. Then service was established 1 block at a time on the Company's mains after the same was inspected very carefully. Before each house was connected it was inspected by the Department of Electricity and also by one of the Company's experts, and a careful test was made for broken wire and grounds. Service was then restored.

In order to get service for the street railway the energy from the water power plant and also steam plant from "Station A." which has frequency of 60 cycles, must pass through frequency changes at Martin power house, where it is changed to 13,000-volt at 25 cycles, 3Φ. Two lines of 13,000 volts, 3Φ, connect Martin power house with Geneva avenue station, which in turn connected with the Turk and Fillmore street station and steam plant at North Beach belonging to the United Railroads. There are also 2 other 13,000-volt, 25-cycle lines from the Martin power house to Bryant street station, which is also connected by 2 lines to meet lines between Geneva avenue and Turk and Fillmore substation. It was possible to run the frequency changes as soon as the United Railroads had cleared their trolley so as to be ready to receive energy. Connection was re-established in the usual manner and cars were immediately allowed to run.

It may be interesting to note that in sub-stations where lead-covered cables extend from main floor through tubing to subway, that the lead was not melted off the cable more than 6 inches below the floor line. This was true in sub-stations where second floor contained oil transformers, which allowed their contents to run down the walls and burn on the floor. The fire was so hot in these stations that one could peel off with their fingers from 1 to 1½ inches of the solid brick wall which had been laid in cement. In one case the wood trap door into subway burned away, but directly underneath, and about 2 feet away, was a pile of old rags containing oil and grease which did not ignite. In another station 5 gallons of gasoline remained in the tunnel with the trap door burned away, while building burned down and was also dynamited.

Discussion.

Mr. Berkley—I do not want to let this paper go by without an expression of tribute to those who did the work, to the men behind the gun. I want to thank them for it.

Mr. Reynolds—I was not to blame for being at San Francisco on April 18th; but I was there, and after I found what had been done and the difficulties that we had to overcome, I was glad that I was. After listening to the paper by Mr. Jones I can see another bond between the electric and gas departments. I never knew very much about gas; I was never interested in it, except to pay gas bills, until these complications arose between the gas and the electric departments. A great many of the gas mains ran alongside our conduits. Every time a gas main blew up the manhole was a good place for the gas to collect, and it went up also, but the gas department afterward squared itself by letting me use part of their gas mains to build my mains in. There were 3 or 4 gas pipes in the streets, and as it was in the burned district, and they did not need gas, the gas department permitted me to use the gas mains. So we have another bond between the two departments.

Mr. Jones—Mr. Reynolds, as you have referred to the giving up of the gas mains on the part of the gas department to the electric department, for the reason, as stated, that we did not expect to get any business in the burned district, I would like to say, and I think you will agree with me, that to-day practically every street in San Francisco is served with gas. We have gas pressure in the burned district, but, as you all know, we have had several competing gas companies in San Francisco, covering a period of several years, and in some of the streets there are as many as 5 or 6 gas mains, ranging in size from 16 inches to 3 inches. We found it would serve our purpose better, and reduce our leakage, if we transferred our service to 1 or 2 of these larger pipes in the streets; for instance, if there were 10-inch and 16-inch pipe on opposite sides of the same street downtown, and several smaller mains which had belonged to these competing companies years ago, we would serve our end better by connecting our services to the two larger mains and scrapping the smaller ones. Mr. Reynolds found that he could use these smaller mains as conduits for his electric system, but it was not because the people downtown did not need gas.

Mr. Reynolds—I will call Mr. Jones' attention to the term I used. I did not mean that they did not need gas, but that they did not need it for a few days after the fire. There was nobody to supply gas to.

The Acting President—If there are no more questions to be asked on the paper by Mr. Reynolds, we will pass to the reading of the paper by Mr. F. A. Leach, Jr., on

THE EQUITY OF SLIDING SCALE GAS RATES.

The equity of a sliding scale of rates has long been conceded in our electric business. Why not, then, in the gas industry? It is a first principle in our purchasing department to demand a low rate by dozens, a lower in gross lots and a minimum rate in carloads. Our customer naturally considers that he is entitled to a lower rate in quantity on his gas the same as he would receive on the other fuels he might buy. Fuels are mentioned advisedly, for a sliding scale of gas rates would affect our fuel sales very materially. Such a schedule as is herewith submitted would be attractive to large establishments now using various other kinds of fuels, because we have not seen our way clear to make any but a regular rate. We now have among our customers whose accounts run over $300 per year, laundries, candy makers, coffee roasters, can plants, fruit canners, photo-engravers, restaurants, delicatessen stores, sausage makers, hospitals, stereotypers, paper hangers, gas engine customers, etc., and practically every one of these use some other fuel for part of their operations because we have not offered sufficient inducements to obtain their entire business.

In the field of illumination, our prominent merchants were induced to install gas arcs, and many of them now burn only on the peak on account of expense; but if the rates were lower for additional and larger consumption, would he not be tempted to keep his place of business bright as day long after the doors were closed? He also has many dark corners which need illumination all day, that would receive attention. In this way the time limit of his load would be largely increased. The schedule is purposely arranged to exclude the householder, for should one housewife have a higher rate than her neighbor, no matter the size of the bill, a "poor gas" complaint would lose its terror.

In Oakland, Cal., we have tried the sliding scale principle on the householder by making a lower rate for fuel or day consumption. This has proved eminently successful. It has practically doubled our consumption, as almost 50 per cent. of the gas used is day output, and our Superintendent, Mr. Beck, reports it is harder to keep the holders up from 7 to 10 A.M. than from 7 to 10 P.M.

The instructions received with the assignment of this subject were to argue it from both sides. Now, after several weeks' study, the interest of both parties seems focused on the equity of a sliding scale. Surely all purchasers are entitled to a lower rate for quantity, and there is great equity to the Company in increased sales. Now, that we have decided a schedule is desirable, costs must first be studied to determine the latitude available and still maintain an adequate profit on the output. For the purpose of this argument, we will say that: Manufacturing expense is .4 of total cost; distribution expense is .3 of total cost; fixed expense is .3 of total cost.

For the sake of argument we will also divide the total profit into the departments of manufacturing, distribution and fixed expenses, so that the above apportionment will represent the cost and profit in each department. Then, for an increased consumption, requiring no additional interest on bonds, no additional insurance or taxes, no additional officers, salaries nor dividends, we could allow 30 per cent. discount and still be doing better than when we were only delivering the original limited amount. In addition to this we can draw from the distribution department the cost of statement taking, billing, collecting, etc., which is about 10 per cent. of the total costs. As these expenses are no greater on a large bill than a small one, we may add this amount to our available discount, making it without question 40 per cent. An ideal division of this would be:

Monthly Consumption, Cubic Feet.	Per Cent. Discount.
Over 20,000 and under 30,000	10
" 30,000 " " 40,000	15
" 40,000 " " 50,000	20
" 50,000 " " 75,000	25
" 75,000 " " 100,000	30
" 100,000 " " 150,000	35
" 150,000	40

Many would hesitate before publishing such a schedule of rates; but would we hesitate to close a contract guaranteeing a minimum monthly revenue of 60 per cent. of the price of 150,000 cubic feet of gas? I believe we could see our way clear to enter into such a contract. Why

not, then, let our wares be known with the price marked in plain figures? It will be attractive to some prospective buyer.

Discussion.

The Acting President—Gentlemen, Mr. Leach's very interesting paper on this question of rates, which is one of the most important in the gas industry, is before you. There are a great many various opinions on the subject, and it is likely many of you share those expressed by Mr. Leach in his paper, but the paper should call forth a good deal of discussion. I think the final solution of the matter lies in a full and free discussion of the subject more than in anything else. I realize the fact that it has come to be the practice in this State to charge a uniform price, but as some companies represented here are operating under a sliding scale, we would be glad to hear from them. Mr. Cline, what is your practice in Los Angeles?

Mr. Cline—We have a uniform rate for gas and a sliding scale for electricity; but I am a firm believer in a universal rate. I do not think that either of them should be sold on anything but a uniform rate, with the exception, perhaps, in some small cities where the rate may be very high. I think then it might be well to give a sliding scale rate.

Mr. Jones—What is your rate in Los Angeles?

Mr. Cline—85 cents.

Mr. Lowe—Mr. Britton is a man who from time to time has changed his opinion on the subject through his various years of experience. I would like to hear from him.

Mr. Britton—You do me an injustice. I have always been an advocate, as my work will prove, of a sliding scale gas rate. I was the instigator of the paper read by Mr. Leach. He approached it with fear and trembling. He was opening up to himself a new field of thought and did not know just exactly how to tackle it. I disagree entirely with Mr. Cline. I remember when the gas man, 30 years ago, was a demigod, in his own estimation—he didn't believe in anybody but himself and his stockholders—the public had no consideration; and until electricity, in 1882, began to stare him in the face he took no active part in promoting his sales of gas. He meant well, perhaps, and had a peak between dark and bedtime that taxed every energy he possessed. He built big holders and stored his product during the other hours of the day that he might meet the supply during those 2 hours. Then fuel gas became a factor, and he has lessened his peak, but not entirely. He still maintains 3 distinct peaks, one for the morning, 1 for noon and 1 for the dinner hour, and then the theater peak. We, in our days, in San Francisco before the fire of April 18th, had these various peaks. They were definitely marked upon our output charts. You could tell when people got up in the morning, when the old man went to work, when luncheon was served, and when the old man got home at night, and when the family went to bed, after they got home from the theater and cooked something on the gas stove. The gas appliance manufacturing concerns have in the last 4 or 5 years perfected many appliances calling for gas as fuel which has largely increased the use of gas. These are being found by our solicitors, not only in San Francisco and in Oakland, but even in some of the smaller towns; appliances that were not dreamed of 2 or 3 years ago. The brains of our men are developing means for the utilization of gas for fuel purposes, and you have to meet competition in oil or in cheaper coal or in wood. It does not seem to me there can be any argument against the proposition that if you can maintain a working force and invested capital in your generating plant, and more particularly in your distributing system, that will represent as we say in electricity, a 90 per cent. load factor, it is your duty to do it. Now, you cannot do that without making the rate and the price to the consumer one that will be attractive to him. The man who will put up a factory—a can factory, for example—as men are doing here, and show you that, on a basis of 60 cents per 1,000, they can compete with you, it seems to me you are working against your own interest if you do not take it at 60 cents per 1,000. If your manufacturing costs are less than that cost, every dollar you make from the delivery of a large quantity of gas to the consumer over and above your manufacturing cost is practically profit. There can be no question about that. The generating apparatus makes it, the holders store it, and your pipes distribute it, and your office collects it, whether your bill is for $1 or for $500; and if the equity applies to your electric light service why should it not apply in a greater degree to your gas service? In the electric light service you make a sliding rate, establishing a base rate, but you cannot store it only in limited degree. In the direct current service you have your storage batteries, of course, to draw upon, but you know how utterly impossible it would be to serve any great degree of territory by your direct current service as against alternating. You can't store it up. With your gas you have profits in your tanks and in your holders. As it costs you nothing to deliver it, why should you not make a man who will give you a bill of $1,000 a month a better rate than a householder who will use only $1.50 worth of gas per month? It seems to me that, with a fixed standard or rate, where the man who will only use $1.50 worth of gas in a month, and who has electric lights in his house, should not be put in the same class with the manufacturer who will offer to make a contract for a consumption aggregating as much as $1,000 per month or more. It seems to me it would be fighting against the interests of the corporation which I represent if I turned him down. I think the sooner we apply ourselves to the practice of selling our commodity, as every other commodity is sold in the market, the sooner we will get the confidence of the people? When we arbitrarily say we will make one rate for gas, and begin to carry it out, then you invite trouble, and other conditions will confront you which will absolutely in the future work to the detriment of yourself. That is my strong stand on the subject. If gas in the holders costs you approximately 30 cents per 1,000, any amount over and above that that you can sell in large quantities is a straight gain, and you are throwing that money away if you do not take it in competition with any other fuel that you know yourself will compete with your gas. I am sincere in that and have been for years, and if you will look back through the proceedings of the Gas Association some 8 or 10 years ago you will find I was arguing that very same thing at that time. Now, while I am on my feet I want to say another thing. I do not want to let these papers on the restoration of light and fuel to San Francisco after the fire pass without comment. I felt a delicacy about speaking because I was one of the refugees before the fire. I went away from here the 7th of April, and was in mid-ocean when the fire occurred. I was not here to witness the efforts of the men in connection with this Company in both departments, but I was back in time to witness what they had done, to witness the closing up of our affairs and to witness the work that had been accomplished. I have not been through anything else that has been as calamitous, but I think this Association should go on record before the meeting is adjourned to convince those who read these proceedings of the temperament and conduct of the people of this city during the dreadful days that followed April 18th. I know from letters received from the East that the men back there are looking to us to say something to-day, something at this convention that will show to the people of the East what sort of temperament we have in California, especially in the gas and electric business. Mr. Jones tells us but little, as he states everything about himself very modestly, and Mr. Reynolds (his first effort, I think in trying to write a paper) is very modest. Now, the men who are here to-day should go on record with an expression for the men who went through that calamity. Not only here in San Francisco, for there are men here from Santa Cruz, San Jose, San Rafael and other points, who had their trials and troubles. They proved their worth, and we of California are proud of California, we are proud of this part of our State. I do not want to talk any more, for, as I said before, I was not here and have no right to talk. I was not a witness unfortunately to the fire. I have wished a thousand times that I had been here and gone through it with the rest of the boys, but I was not permitted by the irony of fate, so I know only what I have been told. Still I saw enough. I saw men broken down with the work they had done, nerves shattered, health gone—I saw the results of the work they had done. Some of them have gone away on a recuperating trip, but the men stood by it, and that is what I like about the men and I think we ought to say something, and say it more positively than I can.

Mr. Lowe—The way to get Mr. Britton to tell you what he knows is to antagonize him a little—I discovered that a number of years ago. I believe it would be very fitting to appoint a committee to draft a resolution covering that period of the city's existence, and in connection with this resolution I think Mr. Britton's remarks should be recorded.

Mr. Jones—Referring again to the matter of rates, I will say that in California there has been an argument against the sliding scale for gas rates. Some of our cities have charter provisions requiring the municipality to fix the gas rates from time to time, and I find that municipal authorities are apt to take your minimum rate as the price of gas in that town when they are fixing other rates, so you have to be a wee bit careful about naming a low price, because that seems a potent argument to the municipal authorities or the city fathers that that is the price at which you can afford to sell all your gas. They are slow to realize there may be a reason for selling gas during the daytime when it is not the peak hours—they overlook altogether the right to wholesale and retail gas as any other commodity is sold.

Mr. Lowe—I am inclined to agree greatly with what Mr. Jones says, and I think Mr. Britton perhaps loses sight of the socialistic tendency of the times.

Mr. Britton—Not I. I believe that if you establish low gas rates once, which under ordinary circumstances you could not afford at all, the municipality is apt, as Mr. Jones says, to consider that a money-making rate or you would not grant it, and they do not consider the reasons of its being a money-making rate. There is no question at all but that, after you reach a certain point in the development of your business, after you have passed the point of merely earning your operating expenses, every foot of gas you sell thereafter costs you practically only the material that goes into the gas, and that is, of course, one of the reasons that the gas business is a good business. But the municipal authorities, however, do not recognize the fact that we lose money on a great many consumers, even if we make money on a few, and they would be apt to consider any low rate a money-making rate.

Mr. Lowe—I am inclined to side with Mr. Cline. I believe in a single rate where you are to go before the public; there you do not handle each consumer individually. These are my views on the question entirely. I think if you are going to make a sliding scale rate of it, it should be based upon the amount of gas sold. I think we can learn a great deal in the sale of gas by observing the movements of the railroad companies—they do not let us know their business. We can't do that as well in dealing with the public as a whole, and in doing so I believe it is best to develop your business probably a little slower; but treat them alike. If you do not, you are in a hornet's nest.

Mr. Cline—I agree with Mr. Britton that you can develop your business a little more rapidly by granting sliding scales, but you do it at the expense of many sleepless nights.

Mr. Newbert—How about the electric business?

Mr. Lowe—Unfortunately, this is not an electric convention.

Mr. Clement—In this connection, and speaking of City Councils and the regulation of rates by them, I have in mind a circumstance which occurred while I was in charge of the Salinas plant. One of the councilmen was a brewer, and consequently a great friend of mine. He had a small ice plant in connection with his brewery, and for motive power he used a gas engine. Several times he visited our office in an endeavor to get a special rate for gas for running his gas engine, and after considerable discussion between the board of directors of the company and myself we decided to give this man a lower rate for gas for fuel. He was the largest consumer in the town, except the hotel in that place. This was in mid-summer, and the rates were to be fixed by the Council in February. This man was a member of the Council, and took as a basis for the fixing of rates the price that we charged him for his power, and as we could afford to sell him gas for power at a reduced rate, he conceived the idea that we could sell it to everybody else at the same rate; so you see the difficulty of a sliding scale in a small town.

Mr. Leach—I think that is only a question of misplaced confidence. I think the majority of our councils and boards of supervisors are fair and rational, and I do not think that we need give any such importance as has been expressed by Mr. Clement to the matter of municipal regulation of rates. The bugbear of municipal legislation does not affect the electric side of the business. We go right ahead and give them a sliding scale in spite of the municipality. I am certain that all or most the members take into consideration the fairness with which the company treats its consumers. Of course, once in a while you will come in contact with a socialistic board, but not often.

Mr. Britton—I would like to say in reply to Mr. Leach that the Boards of Supervisors of San Francisco in the past have recognized the equity of a sliding scale of rates for electricity. They have been argued with by everybody in connection with the gas and electric light business. They have recognized the equity of it by making a very mild sliding scale of from 9 to 5.4 cents per kilowatt. But we all know that current is sold in San Francisco at a very much lower price than that. Now, I think they are open and amenable to argument on the question of a sliding scale rate for gas, and, besides that, they based their rate not upon the quantity consumed, but have gone further than that in the past and have given this company the right to charge upon the basis of installed capacity, so that a consumer who has a large installed capacity, which he uses only on one or two occasions during the year, will pay a higher rate per kilowatt for his current than a consumer who has a smaller installed capacity and uses it all the time. The same arguments that have prevailed upon the supervisors to make a sliding scale rate for electricity surely would be as potent to them on the question of gas, and because we could afford to make a minimum of say 50 or 60 cents per 1,000 would be no argument that we could sell our entire output at that figure. The only provision that I am afraid of in the California charters is one that the city shall receive as low a rate as any other consumer. It does not qualify it by the usual statement "for like service;" but it is broad, and you cannot afford to give in cities like San Francisco or Oakland the lowest rate that you will charge anybody else. Why should the city pay more? Because you contribute to its taxation. But the city should get a smaller rate. The large consumer who needs no collector to call for his bills, and who pays dollar for dollar, should get the benefit of it. He sends his check the day the bills are sent, or the day afterward, and your loss is nil.

Mr. Jones—I think we are on very dangerous ground, when we know that a certain output of gas costs a certain amount of money for distribution and fixed charges, and that any consumption of gas over and above that amount may be sold at a slight profit over and above the cost of gas in the holder. This, it would seem to an ordinary business man, would be placing the burden of the distributing cost and fixed charges on the upbuilding business of the city to a certain point and to a certain amount of your gas consumption, of carrying your fixed charges and distributing costs, and the other man who came in afterward would operate at their expense by getting gas at a lower rate.

Mr. Pearson—I have always been prejudiced against this sliding scale, but Mr. Britton has converted me. I am sure, I am willing to acknowledge it, and to try it. In Cincinnati they are selling gas at $1.50 through one pipe and at 75 cents through another—all the same gas. At Bloomington, Ills., they were doing the same thing until about 18 months ago. They were getting $1.35 for lighting and $1 for fuel— all from the same plant, maintaining 2 meters. This same question came up with the Council, to take the lowest minimum rate as the basis for making a rate. It was neither too much nor too little. A dollar was all right, and the company finally adopted $1 as the rate. Personally, I know that the business has increased so materially that the receipts of the old company do not compare with that of the new. I heartily agree with friend Jones as to our liability, and some day we have to come to this. There is no doubt about it. Referring to Mr. Britton's idea, I feel that the man who buras 150,000 cubic feet of gas is just as much entitled to consideration as any other wholesaler, and if you cannot explain it to a town council there is something wrong with the explainer.

Mr. Lowe—One feature in connection with this discussion that strikes me, is that the electric end of it is benefited by the bad stand of the gas men as before the community. A number of years ago the gas men were carrying the brunt. We taught everybody what a cubic foot meant and they knew just exactly what they were getting for their money, but the electric man entered the field and beat us over the head with watts and volts and ohms and all of these mysterious terms which the city fathers did not yet understand. If they had known what they were they would have gotten after them with a sharp stick. I know very well that at the various times the company went before the board their great thought has been to maintain a gas rate. They would spend days and nights going over the question of gas, opening their books and teaching the supervisors what gas cost delivered to the consumer and what rates they were rightly entitled to. They would pass the electric rates up to the eleventh hour, and after about 30 minutes' explanation they would settle the electric rate question, because they did not know what they were talking about. This is the only reason that you have been able to obtain an exalted position over the gas man. I think when the question becomes better understood there will be no such thing as a sliding scale. I am a firm believer in it. As far as the development of the business is concerned, and for the general peace of mind of the gas man, I think his best plan lies in serving a general rate.

Mr. Pearson—Before this subject is passed, I move that a committee be appointed to draft a resolution covering the remarks of Mr. Britton, respecting the excellent work done by the gas and electric departments in the city of San Francisco in her distressed hour. [Carried.]

The Acting President appointed on this committee all of the Past Presidents of the Association in attendance at the convention, with the exception of Mr. E. C. Jones. He then appointed as a

COMMITTEE ON NOMINATION OF OFFICERS,

Messrs. E. C. Jones, W. B. Cline and W. F. Boardman.

The sessions were then declared adjourned until 10 A.M. of the following day.

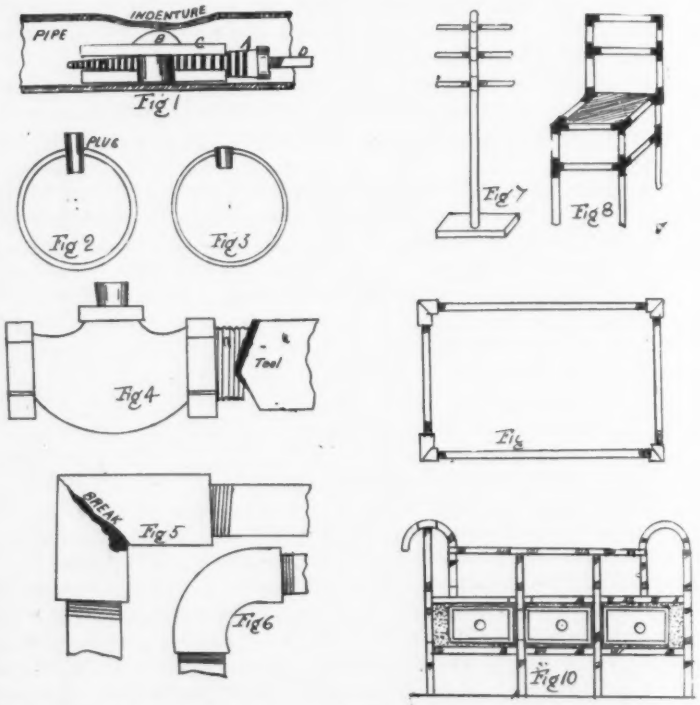
(To be Continued.)

[Communicated by "Inspector."

The Old Gas Pipe Man.

Old gas pipes are obtained from two or three different sources. There are men engaged in the collecting of gas pipes and pieces thereof from the junk shops, and others make a business of buying all the gas pipes of a building in process of being torn down. Then there are gas pipes obtainable in the back alleys, where they have been thrown to the waste pile. Old gas pipes come from the rear of pipe-fitters' establishments and from various other sources. The men who buy the gas pipes by the lot in a condemned building handle the situation on a larger scale than anyone else engaged in the second hand gas pipe business. These men are ever on the watch for buildings about to be torn down. They watch the trades' papers for advertisements of bids for old material, and enter the old material market, keeping in touch with what is going on in the second-hand gas pipe line. They hear of a party bidding for the brick or the sash of a condemned building, and immediately proceed to examine the structure and estimate the value of the gas pipe in it. They have to take a number of factors into consideration. The age of the building and the piping must be figured on. The action of the atmosphere or rust has tended to weaken the pipes as time passed. Or perhaps the pipe joints have been submitted to a constant strain due to vibrations of the walls. Perhaps the pipe was of inferior grade in the beginning. Then the mode of removal has to be calculated and expense summed up. If the piping is so arranged in the walls that it cannot be removed readily, the lump sum offered for the stock is correspondingly lower. In cases where buildings are torn down to make room for better edifices, some very good piping is often procured; but when the piping is on the market because of the burning of the building, the pipes are usually badly warped and imperfect. In fact the heat of the fire usually renders the piping unfit for further service and it must go to the old junk pile. The best kinds are secured from buildings in which new installations of pipes are made. Then some very good systems of pipes are often discarded to make room for the newer system. In buying second-hand gas piping the threads and the joints ought to be examined. Often these are in a very poor condition and new threads must be cut before the pipe can be used.

When the dealer gets the pipe to his shop, the first work involves the assorting and refitting. Many of the pipes are slightly indented and the process shown in Fig. 1, is employed to elevate the depressed portion to the correct level. A stud with a beveled screw is used. There is a cap *B*, fixed on the upper part of the stud, so that as the slip *C* is opened upward, the cap *B* is expanded up and against the interior of the pipe wall. The tapering screw *A*, is operated by the shaft *D*, hence any depression in a pipe may be rectified. Then there are pipes in which leak holes prevail. These are plugged as a rule. Fig. 2 shows the mode of inserting the plug into the wall, then the plug is cut off on the outside, even with the surface as in Fig. 3. The valves are of considerable value in old pipes. The brass work does not depreciate very much in worth, and oftentimes the valves can be overhauled and made as useful as new ones. The old gas pipe men often make a separation of the brass fittings of gas pipes and deal only in these. In one establishment the pipes were all resold to the junk dealers and stop-cocks, jets, valves, chandeliers and general brass fittings only handled. Special tools were devised and used for removing broken ends of pipes from sockets of cocks. In Fig. 4 is exhibited the point of one of the cutting tools. The cock is placed in a soft cushion of leather padding and held in a vise. The cutting tool point is inserted securely against the stub of the threads as shown, and by turning the same the threaded part is usually turned out. The tool is turned with a brace. If the threaded end is rusted in too tightly for this, some chipping is required to remove the particles. I noticed that many of the joints of the discarded pipes were fractured, as illustrated in Fig. 5. In restoring these joints the round elbow is used in almost all cases; the round elbow is shown in Fig. 6. Many of the pipes are in good condition when bought up by the dealers and are simply cleaned and painted. The cleansing operation is done in diluted lye water, which removes greasy substances, if any. Then the pipes are mopped dry and rubbed down with waste with a little oil. Sometimes the exterior is coated with black varnish. The bad ends are cut off and new ones made. In fact, almost all of the threaded ends are recut. Many of the unions are discarded and new ones used. After a thorough overhauling, the old piping is rendered quite serviceable again. Not all of the piping goes back into the usual sources of employment. Some of it is bought up by the furniture manufacturers and is made into household articles. The manufacturers buy the joints, and recut them to suit the special needs of the articles desired. In Fig. 7 is shown a hat rack for hall use constructed with pieces of old gas piping. The upright piece is inserted securely into the base board, and is drilled to receive the pieces which are extended outward as shown. The holes for these pieces are cut straight through and are threaded. Then the pieces are cut with a like thread and screwed in. A plug is used between the two pipes inside the upright to steady the arms. Fig. 8 shows a form of chair wrought out by using pieces of old gas pipe. Fig. 9 is a frame and Fig. 10 a stand with drawers. The pieces of



piping can be finished a jet black to good advantage, or they can be colored other tints. Enamelling is used in some instances. Much of the second-hand piping is useful for general purposes in shops, but some of it is so far gone that it is at once discarded. Chances are taken in using second-hand pipe, however, and the majority of gas pipe fitters avoid it, even though it be very cheap in price.

Effect of Hydrogen in Oxygen Used for Calorimetry.

The *Journal of Gas Lighting*, in reporting the studies by Herr Graefe on this subject, as carried out by him in Webau, Germany, notes that the authority quoted says:

The compressed oxygen offered for sale at the present time is made in one of three ways—viz., by the chemical process of passing air over heated barium oxide or an orthoplumbate, by the fractional distillation of liquid air, and by the electrolysis of alkaline water. Only the latter kind of oxygen is liable to contain hydrogen; but, owing to the great difference in speed with which the two gases diffuse, electrolytic oxygen is prone to be contaminated with hydrogen, and, if the apparatus is not properly attended to, the proportion may reach 6.5 per cent., and the mixture becomes explosive. The explosion of a vessel of compressed electrolytic oxygen, owing to the presence of hydrogen in it, has already been recorded. As a rule the amount of hydrogen in compressed oxygen does not exceed 2 or 4 per cent.

Some years ago, it was shown qualitatively by Thomas and Van Leent that if there is hydrogen in the oxygen with which a calorimetric bomb is charged, the results obtained on burning a fuel are higher than they should be. Graefe has now investigated the subject quantitatively, igniting two samples of paraffine oil in the Hempel bomb with oxygen containing known quantities of hydrogen. In each experiment, a weighed amount of oil was dropped upon a mass of cotton wool previously introduced into the bomb, oxygen was driven in till the pressure reached 5 atmospheres, and then allowed to escape in order to drive out most of the nitrogen. The desired volume of hydrogen was next added from a mercury pipette, and finally the bomb was charged with oxygen to a pressure of 12 atmospheres. After deducting the calorific value of the cotton wool, Graefe's results were:

Hydrogen in the Oxgen. Per Cent.	Sample I. Calories.	Sample II. Calories.
..	10,020	9,882
1	10,127	10,104
2	10,329	10,245
3	10,543	10,453
4	....	10,597

It will be seen that the apparent calorific value of the oil rises steadily as the oxygen used to burn it contains a larger proportion of hydrogen; the rate of increase being on an average 180 calories per 1 per cent., or 1.8 per cent. of the true calorific value of the oil. The individual figures representing the increases in calorific value differ from the mean by less than 1 per cent., which, according to Möller, is the limit of accuracy of the Hempel apparatus. Thus if an oxygen containing 4 per cent. of hydrogen were employed in the bomb, the calorific value of the oil would be returned as more than 7 per cent. higher than it should be—an error too large to be ignored in practice.

The weight of oil oxidized in each of the foregoing tests was almost the same, and therefore it could not be ascertained whether the whole of the hydrogen present was burnt, or whether an amount was oxidized proportionate to the volume of oxygen consumed. To settle this point, three other tests were made of the same oil; the bomb being charged in succession with approximately 0.2, 0.4 and 0.6 gramme of paraffine—the oxygen containing 2.5 per cent. of hydrogen in each case. The differences from the true calorific value so obtained ranged only from 385 to 422 (mean 407) calories—*i. e.*, were sensibly unaffected by the quantity of fuel employed; the amount of hydrogen oxidized being proportional to that of the oxygen consumed.

Hence it follows that an oxygen contaminated with hydrogen may be used for calorimetric purposes, provided, of course, that the proportion of hydrogen is not sufficient to render the gas dangerous on the grounds of explosibility. By analyzing the gas in each cylinder, the proportion of hydrogen can be found, and a correction can be made for the error introduced by it. In the case of oil, each 1 per cent. of hydrogen increases the true calorific value by 1.8 per cent.; so that the experimental result has only to be multiplied by

$$\frac{100}{100 + x \times 1.8}$$

(where x is the percentage of hydrogen) to obtain the correct figure.

Qualifications of an Engineer.

In an address delivered before the engineering apprentices of the Allis-Chalmers Company, at its Cincinnati works, August 30, 1906, Prof. V. Karapetoff, Cornell University, outlined the lines of study, thought and practice which an engineering student should follow, in a very illuminating and instructive manner. In outline, he said: Three essential conditions for a successful engineer are: (a) Professional knowledge; (b) knowledge of business forms and of human relations; (c) strong character.

While in the works learn the construction of machinery, the manufacturing operations and testing. The question "why" is of decided importance; do not be satisfied with "how." Get into the habit of analyzing.

To get full benefit from the factory work: (a) Keep regular notes on your work; (b) make sketches; (c) keep on a separate sheet your doubts, to be straightened out at a future opportunity; (d) make rough check calculations on the machine you are working with.

Devote part of your evenings to systematic study. Read at least one engineering magazine regularly, and keep some kind of an index of information on at least one subject in which you are particularly interested. Go over your college books and notes and see that you are sure in fundamentals. Gradually get familiar with the standard engineering books. Select some one branch of engineering, and devote all your extra time to it. Do not miss a chance to make an original investigation whenever you have an opportunity.

Observe the characters of men you are working with; in particular, the influence of age; education, nationality, etc.; things that make them successful; things that are an impediment in their work; things that they would like to have; things that make them happy and unhappy; betterment work that they would appreciate. Observe the foremen and their ways of conducting their departments; make clear to yourself what you would consider an ideal foreman. Do not judge the foremen by the way they treat you. Observe the general factory system. Get a thorough understanding of the significance of co-operation in modern industry. Do not get rusty in regard to general life questions; continue reading books on philosophy, economics, history, etc. This will make human relations clearer to you. Besides, a man in a responsible position must be a well educated man; he should be posted on many general things, and ought to be able to speak about them.

Recent Patent Issues.

[Prepared by MR. ROYAL E. BURNHAM, Solicitor of Patents and Counsellor in Patent Cases, 833 Bond Building, Washington, D. C., who will furnish illustrations and specifications of any patent mentioned below on receipt of 10 cents.]

832,159. Regulator for gas burners. A. A. Pratt, New York; assignor of one-half to Edwin J. Selley, same place.

832,226. Incandescent gas lamp. L. T. Alton, Brooklyn, N. Y.

832,521. Acetylene gas generator. J. W. Woodson, Fort Worth, Tex.

832,466. Production of ferrocyanide from gas. W. Feld, Honningen-on-the-Rhine, Germany.

832,619. Water meter controlling device. L. H. Nash, South Norwalk, Conn., assignor to National Meter Company, New York.

832,878. Gas range or gas stove. J. Roy, Cleveland, O., assignor to American Stove Company, St. Louis, Mo.

832,886. Inverted incandescent lamp. O. Wiederhold, Jersey City, N. J.

833,023. Acetylene gas machine. F. M. Caler, Los Angeles, Cal.

833,037. Inverted gas burner. C. T. Fuller, Olean, N. Y.

833,070. Apparatus for making gas. L. P. Lowe, San Francisco, Cal.

833,106. Gas burner attachment. A. D. Zimmerman, Boody, Ills.

833,114. Apparatus for treating gas purifying materials. J. B. Cigniul, Nantes, France.

833,137. Apparatus for manufacturing and mixing gases. B. Loomis, Hartford, Conn., and H. Pettibone, New Rochelle, N. Y., assignors to Loomis-Pettibone Company.

833,182. Method of producing gas. J. S. Smith, Chicago, Ills.

833,256. Gas producing apparatus. J. S. Smith, Chicago, Ills.

833,274. Apparatus for analysis of gases. H. J. Westover, Mount Vernon, N. Y.

833,315. Gasholder. W. Gadd, Manchester, England.

833,346. Method of producing heating and illuminating gas. J. S. Smith, Chicago, Ills.

833,399. Apparatus for producing hydro-oxygen gas. A. Lang and H. F. Smith, Phila., Pa., assignors of one-third to C. H. Zink, same place.

833,400. Method of producing gas. A. Lang and H. F. Smith, Phila., Pa., assignors of one-third to C. H. Zink, same place.

833,468. Lamp. A. Lang and H. F. Smith, Phila., Pa., assignor of one-third to C. H. Zink, same place.

833,471. Process of producing coke and gas. F. Logan, Phœnixville, Pa.

833,573. Extraction of sulphur from gas purifying materials. J. J. M. Becigneul, Nantes, France.

833,600. Acetylene gas generator. T. S, Holt, Federalsburg, Md.

833,611. Apparatus for making coke and gas. F. Logan, Phœnixville, Pa.

833,662. Device for fastening gas pipes. E. Bartholomay, Rochester, N. Y., assignor of one-half to H. Duryea, same place.

833,673. Means for maintaining heat in gas producers. E. Capitaine, Frankfort-on-the-Main, Germany.

Design 38,288. Gas lamp. A. H. Humphrey, New York city. Term of patent, 14 years.

833,861. Vertical retort for the destructive distillation of coal. H. W. Woodall, Wimbourne, and A. M. Duckham, Parkstone, England.

834,040. Apparatus for gas analysis. A. Bayer, Brunn, Austria-Hungary.

834,093. Gas meter. A. S. J. Weir and T. J. Henning San Diego, Cal.

834,109. Gas generator. G. Cothran, Chicago, Ills., assignor to Chicago Title and Trust Company, Trustee.

834,238. Apparatus for manufacturing producer gas. W. H. Adams and F. Powell, Portland, Ore., assignors of .25 to said Adams, .15 to said Powell, and .60 to the Ladd Metals Company.

834,239. Apparatus for the manufacture of illuminating gas. W. H.

Adams and F. Powell, Portland, Ore., assignors of .25 to said Adams, .15 to said Powell, and .60 to the Ladd Metals Company.

834,240. Process of smelting. W. H. Adams and F. Powell, Portland, Ore., assignors of .25 to said Adams, .15 to said Powell, and .60 to the Ladd Metals Company.

834,241. Process of manufacturing illuminating gas. W. H. Adams and F. Powell, Portland, Ore., assignors of .25 to said Adams, .15 to said Powell, and .60 to the Ladd Metals Company.

834,328. Feeding mechanism for acetylene generators. L. E. Shaw, New York city, assignor to J. B. Colt Company, same place.

834,698. Air drying apparatus. C. O. Williams, St. Louis, Mo., assignor of one-half to Federal Gas Company, same place.

834,710. Apparatus for discharging gas retorts. E. Chervet, Villefranche-sur Saone, France, assignor to Cie. Anonyme Continentale pour la Fabrication des Compteurs a Gaz et autres Appareils, Paris, France.

834,733. Gas saving appliance. S. J. Jeha, Swissville, Pa.

834,831. Acetylene gas generator. J. Margreth, Bergdorf, near Hamburg, Germany.

834,854. Gas meter. V. P. Wilkins, Laporte, Ind., assignor of one-half to E. Scott, same place.

Design 38,304. Gas stove. C. Schaefer, Cambridge City, Ind. Term of patent, 7 years.

834,907. Gas burner. A. H. Humphrey, Kalamazoo, Mich.

835,033. Acetylene gas generator. J. F. Phillippi, West Valley, N. Y.

835,053. Gas lamp. J. Braunstein, Berlin, Germany.

835,117. Lighting appliance for gas lamps. S. Shaw, East Richmond, Victoria, Australia.

835,138. Automatic lighting burner. H. Lyon, Oneonta, N. Y.

835,182. Incandescent gas burner. C. O. Dryden, Philadelphia, Pa.

835,198. Gas burner. J. M. Pfaudler, Rochester, N. Y.

835,293. Gas generating system. F. H. Treat, Pittsburgh, Pa.

Gas Engines for High Speed Railways.

Volume 75 of the Minutes of Proceedings of the English Institution of Civil Engineers mentions the use of gas engines in the central station of a high speed interurban electric railway. As the choice of gas engines for such a purpose is something of a novelty, a few particulars concerning the plant may be of interest.

The single phase electric railway referred to in the communication runs between the towns of Warren and Jamestown, in the State of Ohio. The railway is 22 miles long, besides which there are 9 miles of single track in Warren itself. The speed on through trains is 30 miles an hour, or 19½ miles an hour with stops averaging every 2½ miles. The whole of the power is derived exclusively from gas engines, of which there are two of the Westinghouse single-tandem type, each rated at 470 brake horse power, though space has been left for a third engine of equal size. Each gas engine is directly connected to a 260-kilowatt alternator. All the power for the alternating current line is transmitted at 22,000 volts, which is reduced at the sub-stations to 3,300 volts. This is the pressure at which the trolley line for the single phase motors is supplied; but auto-transformers reduce it to 550 volts for use within the two towns.

Along the route is one still gradient, ¼-mile long, of 1 in 14, which, with a necessary stop at the foot of it, causes considerable fluctuation in the power demanded of the plaut, and which therefore tests the gas engines all the more severely. Full particulars of the valve mechanisms of the engines and of their working, are to be found in the *Electrical World*, New York, Vol. XLVII., pp. 363–6. A characteristic feature of the gas engine design is the adherence shown to steam engine practice. There are valve chambers at each end of the engine cylinders for giving vertical access to the inside. Only natural gas is used, of which there is an abundant and cheap supply in the neighborhood; the cost being about 15 cents per 1,000 cubic feet. It is very clean and of practically constant quality. The cylinders are 21 inches in diameter by 30 inches stroke; the normal speed being 150 revolutions per minute. The tandem cylinder arrangement, by which one power impluse is obtained on each forward and backward stroke, gives an equivalent effect on the crank-shaft to that obtained from a single cylinder, double-acting steam engine, The engines are started in action by means of compressed air. The hours operated per day are 18; the average daily gas consumption being 54,000 cubic feet for the interurban work, and 89,285 cubic feet for the interurban and city load. The cost of fuel per car hour is given at the equivalent of 15.04 cents for the interurban, and 7.56 cents for the interurban and city.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Beloit (Wis.) Water, Gas and Electric Company has put on its payrolls Miss Emily Ritter, of St. Louis, Mo., who has been employed to teach the residents how to intelligently use gas ranges.

"J. M. B.," writing to us from Los Angeles, Cal., under date of the 7th inst., forwards the following interesting budget of news from the Pacific Coast: "I have to inform you that the gas works at Whittier, Cal., were destroyed by fire the night of the 3d inst. The loss was complete as to the buildings, pumps, engines and piping, nothing being left, save the boilers and the shells. As I live at the Beach, 42 miles away, and as the fire occurred about 10 P.M., it was after midnight before I received word. Obtaining an automobile we started across the country and made such temporary repairs as it was possible for us to make, and started to supply gas 12 o'clock Sunday night, furnishing the people with fuel to cook their Monday morning breakfast. We were able, by the use of automobiles, to carry material, such as blowers, engines and apparatus over the country from one of our other plants. We had no insurance on this plant, therefore the loss will be complete. Whittier is a beautiful little Quaker city housing about 5,000 people.

"Walter Forbes, son of James Forbes, of Chattanooga, Tenn., occupies a very responsible position with our Company (the Edison Electric Company), of Los Angeles. He is stationed at Redlands.

"The latest news of the Lowe Gas Company, in the city of Los Angeles, is to reorganize that concern and reduce the prevailing price of gas (85 cents per 1,000 cubic feet) to 75 cents per 1,000. The former rate was established by the Los Angeles Gas and Electric Company. It advertises particularly the improved quality of the Lowe gas over that of the Los Angeles gas, which is made identically on the same plan—another one of that Company's aerial flights.

"The new 5,000,000-foot holder, which is being erected for the Los Angeles Gas and Electric Company, by Messrs. R. D. Wood & Co., of Philadelphia, presented an imposing sight as we first saw it 20 miles away, when travelling to the city on the electric cars, on the occasion of the air inflation of the vessel.

"If all the proposed gas schemes now being hatched on the Pacific Coast materialize, in Southern California gas plants and properties will be as plentiful as grocery stores. We, however, believe that some of the projectors, when they get sufficiently wise through having put in their money in them, will discover that it is not all gold in the gas business.

"Long Beach, Cal., presents one of the most remarkable conditions in this country. It has a population of about 18,000 and supports 3 gas companies, all charging at the rate of $1 per 1,000 cubic feet. It cannot be said that two of them are financial successes, but they are still doing business.

"The Edison Electric Company is spending in Redlands, to better its distribution system, some $20,000. Work will be completed in about 30 days.

"The gas war between the Edison Electric Company, in Redlands, selling gas at 75 cents per 1,000, and the Home Gas Company, selling at $1 per 1,000, is very interesting just now. A similar condition exists at San Bernardino, between the Pacific Light and Power Company and the Home Gas Company there. The outcome is being watched with interest by prospective gas investors."

UNDER the terms of the franchise for a gas and electric company to be operated in Porterville, Cal., by A. Genslein and associates, of Los Angeles, it is stipulated that the maximum selling rate for the first 5 years shall be $1.50 per 1,000 cubic feet; but that no bill shall be rendered for a supply in value amounting to less than $1.50 on minimum monthly account.

MR. GEORGE L. BENBOW severed his connection with the Dover, Port Oram and Rockaway (N. J.) Gas Company on the 15th inst.

THE projectors of the Norfolk (Neb.) Fuel and Light Company say that gas will be supplied from the new plant well before the first of the coming year.

MR. J. D. MCKENZIE and associates, of El Paso, Tex., propose to construct a gas works in Chihuahua, Mexico.

THE Coos Bay Gas Company has been organized by Messrs. Henry Hewitt, Jr., J. J. Hewitt and S. H. Bell, of Tacoma, Wash.

MR. B. O. TIPPY, Manager of the Grand Rapids (Mich.) Gas Company, delivered last week a very interesting lecture on "The History of Gas Manufacture," before a goodly audience of the members of the Young Men's Christian Association of Plymouth Congregational Church. The lecture was in the residence of Mr. G. A. Studley, and the text of the talk was well illustrated by means of suitable lantern slides.

MR. ROBERT S. STORRS, President of the United Gas and Electric Company, of New York, which corporation controls the policy of the Citizens Gas and Electric Company, of Terre Haute, Ind., is authority for the statement that a large sum will shortly be expended in putting the plant in up-to-date shape. The major portion of the expenditure will be made on the distributing division of the service.

MR. EDWARD C. PEEBLES has resigned from the service of the Pittsfield (Mass.) Coal Gas Company.

MR. WM. M. EATON, formerly Manager of the Rochester (N. Y.) Railway and Light Company, is now in active work in the New York firm of Hodenpyl, Walbridge & Co.

THE special meeting of the shareholders in the Hagerstown (Md.) Gas Company, to vote on the proposed capital increase, will be held next Monday.

MR. F. E. HAAG, formerly Auditor of the Westchester Lighting Company, of Mount Vernon, N. Y., has been appointed Auditor of the Hodenpyl-Walbridge Company, with headquarters in New York.

MR. J. E. KING is in active charge of the office end of the business of the Lebanon (Pa.) Gas and Fuel Company.

THE slungshot propensities of the street hoodlums of Chicago have been so forcefully shown recently that Mr. E. R. Diederich, of the gas inspection department of Chicago, was obliged to appeal to Chief of Police Collins for his co-operation with the Board of Education in an effort to abate the damage caused by the urchins. Their main targets are the globes inclosing the public electric arcs.

MR. R. A. SPENCE, writing from Harrisburg, Pa., under date of the 10th inst., forwards the following: "Judge Shull, of Perry county, sitting in the Cumberland County Court, has handed down an opinion which will restrain the borough of Carlisle from selling its stock in the Carlisle (Pa.) Gas and Water Company. The borough was anxious to sell the stock in order to have competition in the furnishing of water and electric currents as well by other companies. Judge Shull, however, contends that the contract between the borough and the Company cannot be annulled. The case will likely be appealed to the Supreme Court."

MR. JUDIAH H. QUICK, a man widely and well known in the building trades in and around Trenton, N. J., and some years ago works Superintendent of the Trenton Gas Light Company during the Chambers regime, died at his home in Mercerville, N. J., the afternoon of the 8th inst. He was in his 61st year.

THE Board of Charity Commissioners, Hartford, Conn., have determined hereafter to use gas for heating the water required for the cooking, bathing and laundry purposes of the almshouse.

THE October issue of "Gas News," published "every little while," by the Gas Department of the Public Service Corporation of New Jersey, notes among other interesting things that in the trunk and bag factory of the P. Steiger Company, of Newark, N. J., 14 machines operated by gas power are used. A 14-horse power White & Middleton gas engine, 2 cut-off saws, 2 rip saws, 1 swing saw, 1 band saw, 1 emery wheel, 1 tongue-and-grooving machine, and sand paper barrel, drill slot, dressing, staining and pinching machines. The last two are particularly interesting. By hand a man can stain 100 trunk slats in 1½ hours, and use thereon 1 gallon of varnish. With the machine 1,000 slats can be done in the same time with a like quantity of varnish. Mr. Paul Steiger invented this machine, 12 of which are in use in the United States."

SINCE the 1st inst. the net rates for gas used in Pottstown, Pa., on lighting and fuel accounts have been put on a parity, that is, $1.35 per 1,000 cubic feet. Heretofore gas for fuel account was sold at $1.25 per 1,000 net.

THE authorities of Columbus, O., have decided to issue bonds in the sum of $140,000, the proceeds to go toward revamping the electric lighting plant operated on public account.

MR. CHARLES RAY has resigned the cashiership of the Waxahachie (Tex.) Gas and Electric Company, to take service with the Dallas (Tex.) Securities Company. His successor in Waxahachie is Mr. C. R. Riley, of Dallas.

THE authorities of Payson, Ills., have granted a franchise for the construction and operation of a gas works to Mr. W. K. Elliott and associates, of that place. It is specified that the maximum sales rate shall not be in excess of $2 per 1,000. The grant is good for 30 years, and Mr. Elliott proposes to start construction work as soon as possible.

MANAGER SLOANE says that the plant of the Calumet (Mich.) Gas Company will certainly be ready for operation before Feb. 1, 1907.

MR. FRANK D. MOSES declares that the Hampton (Va.) works will be completed by Jan. 1.

THE Court of Revision on tax assessments, established for revenue on public account, for the district of Hamilton, Ont., has granted a reduction of $20,000 in the valuation of the Hamilton Gas Light Company's property.

THE New England Gas and Coke Company has placed a contract with the Fore River Ship and Engine Company for the construction of 3 large transportation steamers, each of which is rated to convey a cargo up to 7,200 tons.

THE following official notice respecting the latest cut in gas rates by the Milwaukee (Wis.) Gas Light Company was forwarded us by the courtesy of Mr. S. J. Glass, its President:

"Beginning January 1st, 1907, the net price for all gas used in Milwaukee will be 80 cents per 1,000 cubic feet, regardless of purpose for which it is used. For large consumption the present quantity fuel rates will apply. After January 1st but 1 meter will be set to supply gas for all uses, and duplicate meters now in use will be taken out as fast as convenient. It will be the policy of the Company not to abate in any respect its efforts to make the service rendered by it the best possible. To this end gas consumers are earnestly requested to bring to our attention any troubles that occur, in order that the remedy may be properly applied."

THE residents of Jamestown, N. D., are clamoring far main extensions.

ABOUT a fortnight ago John M. Cresap and S. J. Porter obtained an injunction against the Board of Roads Directors of Allegany county, Md., prohibiting them from allowing the Western Maryland Gas Company from digging trenches in the River Road leading from Rawling's Station into Cumberland. The main pleading was that the Road Directors had not the power to grant the franchise, and that the Western Maryland Gas Company is a "bogus and fictitious corporation organized to evade the laws of Maryland and to abet the work of the West Virginia Central Gas Company."

THE citizens of Bisbee, Ariz., are soon to vote, in special election, upon the proposition submitted by the projectors of the International Gas and Light Company under which they are to be governed by ordinance as to constructing and maintaining a light and power system in that city. The odd part of the proposition is that the Company agrees to pay the expenses attendant upon the voting.

THE gas manufacturing plant of the Public Service Corporation, of New Jersey, Plainfield section, will be shut down on the 1st prox., owing to the completion of the high pressure line from Camden, N. J. That Mr. S. K. Campbell, the spry gentleman who conducts the Public Service concern's business in Plainfield, is rather popular in that territory would seem to be indicated by the following mention, sent on by the correspondent who wrote us about the pipe line development: "The service in this city is directed by S. K. Campbell. He is one of the most efficient superintendents on the Company's staff, and is as highly esteemed by the consumers and the workers under him as by the Corporation heads." Two for his nibs!

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. H. SANDERSON,
MANAGER.

MONDAY, NOVEMBER 19, 1906.

The Market for Gas Securities.

Dullness was characteristic of the city gas share market last week, and the tendency was downward. Consolidated sold up to 140 and down to 137½, the opening quotation to-day (Friday) having been made at 137 to 139. It looks to us that Consolidated at anything under 140 is the cheapest thing on the regular list, and it would not be at all surprising if the next quarterly dividend were at the rate of 5 per cent. per annum.

Brooklyn Union sold at auction this week at 118, but it is neglected by purchasers. New Amsterdam fives are 98½ bid. The inquiry for gas bonds still continues. Peoples, of Chicago, holds just below 90. Cincinnati Gas and Electric is 99½ to par, and Toledo (Ohio) Railway and Light is 30 bid—and it is seemingly cheap at the rate, and Columbus (Ohio) Gas and Fuel sells readily at 38. The Essex and Hudson (N. J.) Gas Company has declared a 3 per cent. dividend, payable to holders of record the 20th inst. The Cincinnati Gas Light and Coke Company will issue $1,400,000 of Treasury stock. It is to be put at par, in the ratio of 4½ per cent. on holdings.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

NOVEMBER 19.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	137	139
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	3,500,000	100	190	295
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	98½	0
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p.ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	105	120
1st Con. 5's, due 1948, M. & N	15,000,000		107	.
Yonkers	299,850	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	5/16	⅜
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,550,000	1,000	164	166¾
Cincinnati Gas and Electric Co.	29,500,000	100	99½	99¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	..	90
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	107⅛	108¼
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co.	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	105
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	58¼	58⅝
Preferred	25,000,000	100	85¼	86
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	89⅛	89⅝
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,465,000	1,000	96¾	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,500,000	20	293¾	295
First mortgage 6's	600,000	..	..	.
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

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Estimates furnished for the erection of complete gas works or the extension and modernizing of old works. All work warranted. Both water gas and coal gas.

EMPIRE GAS IMPROVEMENT & CONSTRUCTION COMPANY,
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1641-2 Address, "H N. C.," care this Journal.

Position Wanted

As Manager of a Gas and Electric Light Plant,

By a man who has successfully operated a combined gas and electric light plant, who thoroughly understands the manufacture of coal and water gas, its distribution under high and low pressures, and who is an up-to-date manager.

Address, "S. C. A.,"
1641-4 Care this Journal.

Position Wanted.

A Capable Manager and Superintendent,

Now employed, desires a position as manager or superintendent of gas, or combined gas and electric plants, in city of 15,000 to 25,000 population. Successful record. Southern or Middle States location preferred.

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By practical man who has had experience in all branches of the business and competent to assume entire management of property.

Address, "J. S.,"
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A Manager and Superintendent of a Gas and Electric Light Plant,

Who has operated successfully the works where now employed, desires to make a change for a larger works, and wishes to communicate with any company requiring the services of a live, up to-date man as manager or superintendent.

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1640-3

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Gas Company Foreman of Fitting Department

Desires a position with up to date company where economizing and executive ability and first-class workmanship are required.

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A situation, either coal or water gas, large or small works. Can report for duty at once. Address, "J. F. G.,"
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A thorough accountant, familiar with gas (both coal and water), electric and railway properties, having supervision of the accounting of 15 companies, would consider an offer for a position outside of New York city. At present employed, but would like to change owing to ill health of my wife. Can furnish A-1 references.

Address, "BOX 240,"
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As General Manager of a Gas Company

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Young man experienced with gas company's ledger work, either as bookkeeper or clerk in gas company. Good, steady position is open for a careful, hard worker, in large New York company. Address, stating age, salary and experience,

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To look after outside construction from power plant to consumers in town of 50,000. Address, stating experience, salary wanted, also giving references,

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WANTED,

Gas Works Working Foreman,

For works operating 2 benches of 6's and auxiliary Lowe water gas set. Salary, $1,500 a year. State experience and where located. Apply to

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16-1 3 BUTTE, MONT.

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Mechanic to Repair Meters.

Address,
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COMPETENT WATER GAS MAKER,

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With a capacity of 12,000 or 15,000 cubic feet per hour. State price, age and condition.

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164 -tf Care this Journal.

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Will contract with gas companies for their entire output of either **aqua ammonia** or **sulphate ammonia.**

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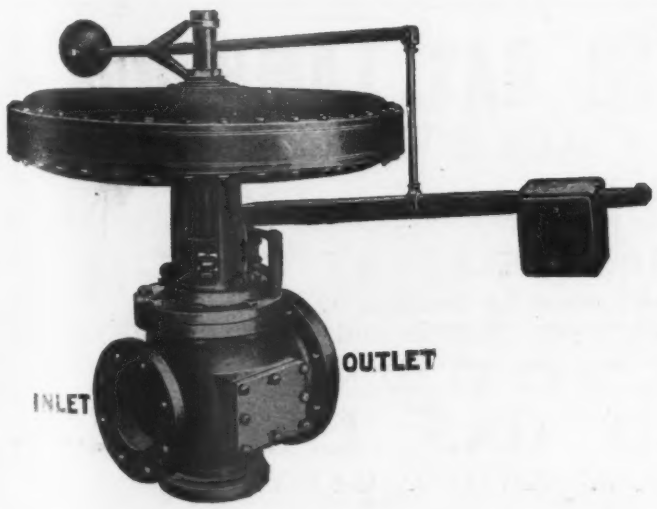

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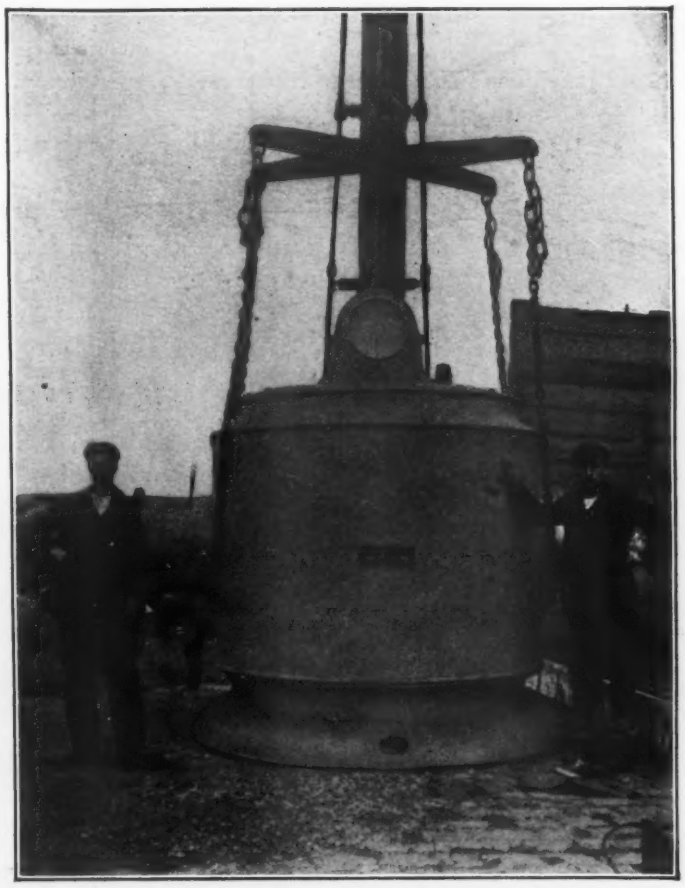

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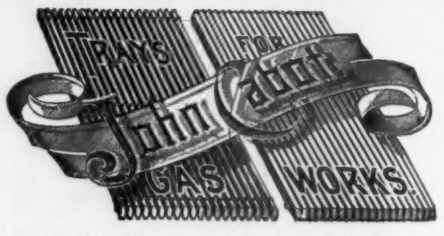

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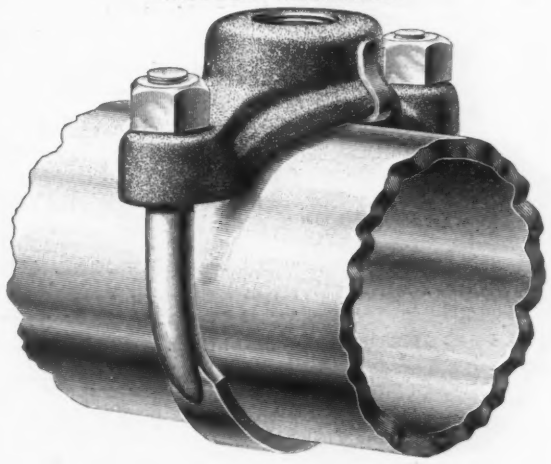

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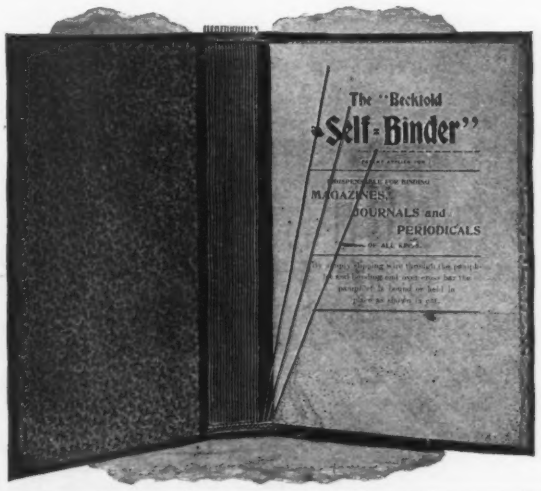

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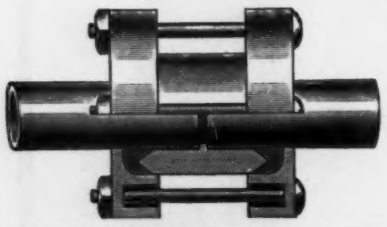

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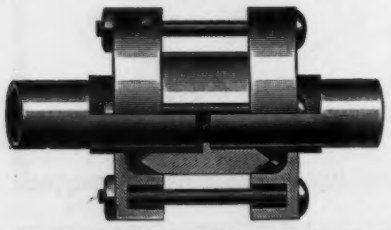

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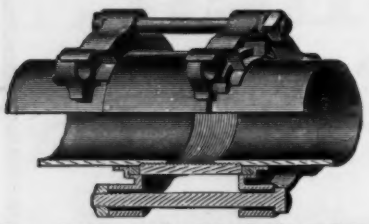

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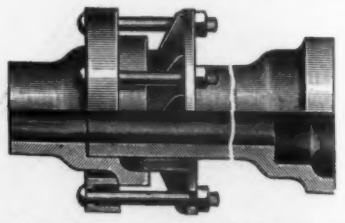

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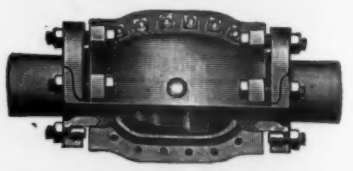

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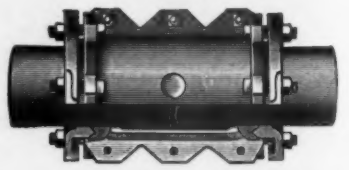

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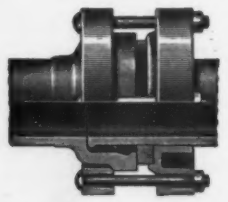

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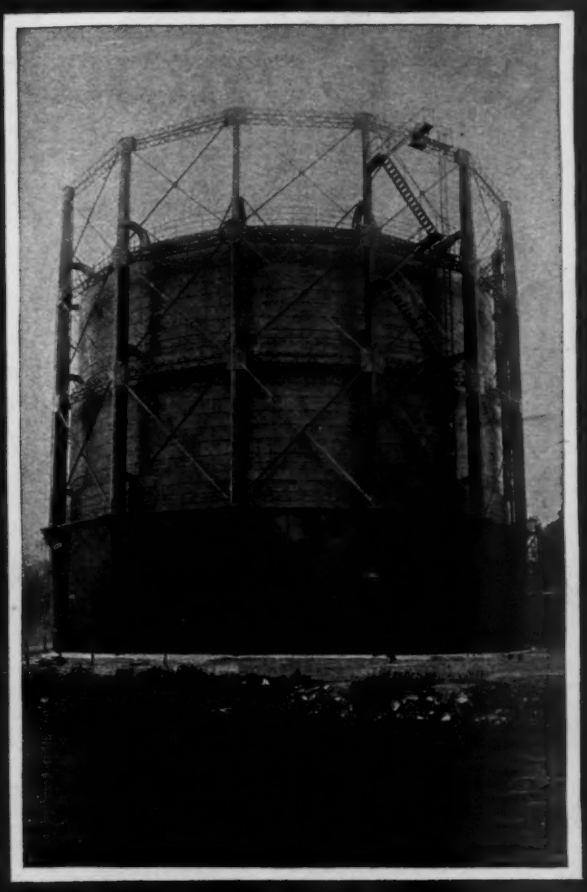

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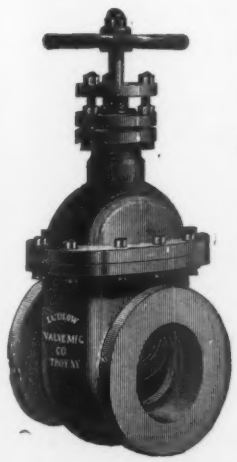

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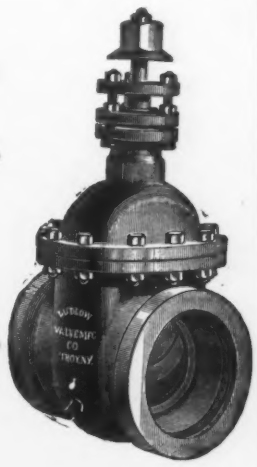

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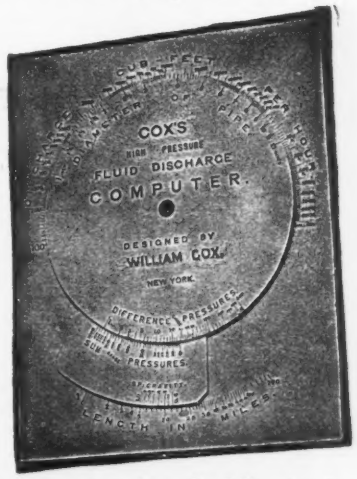

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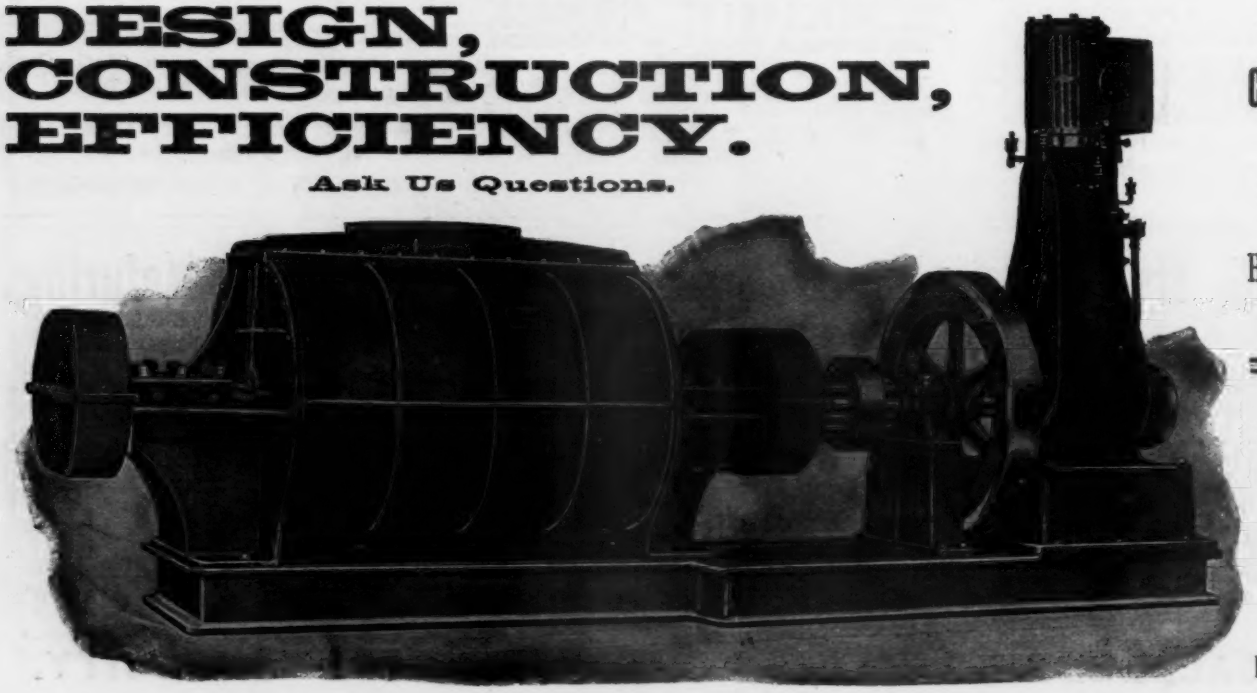

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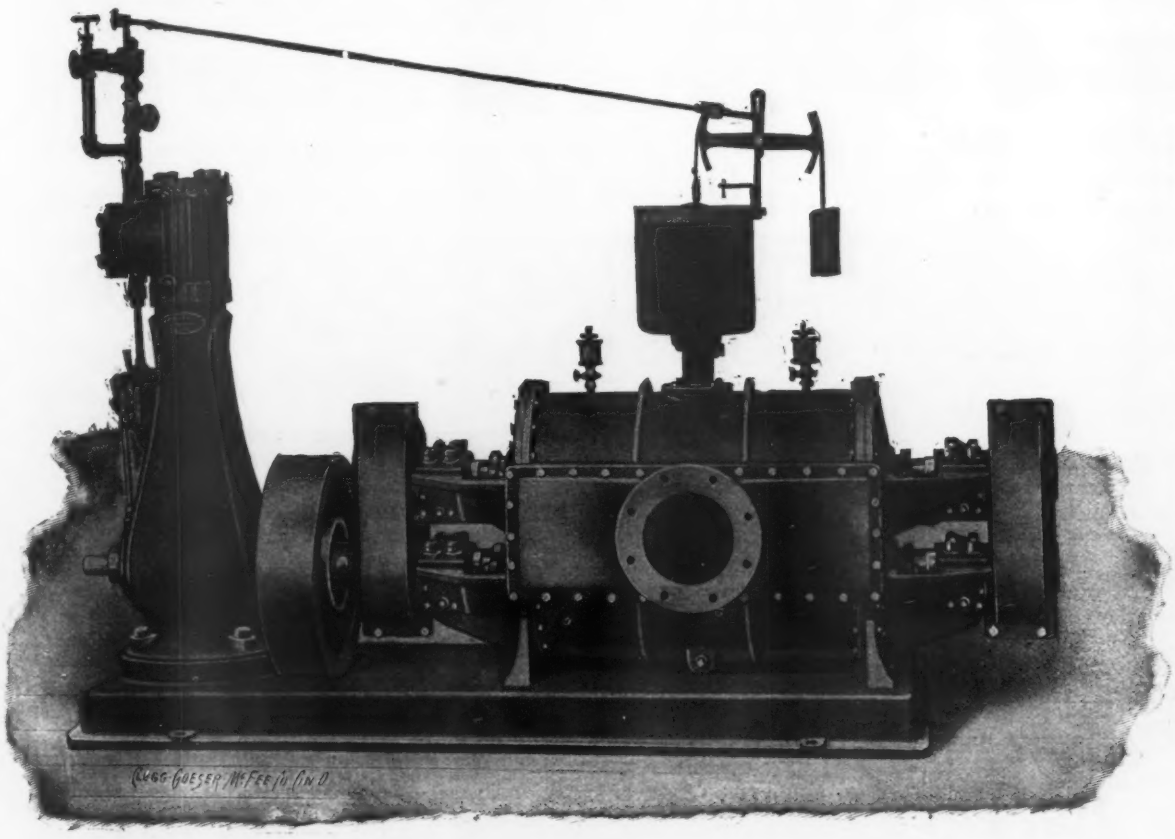

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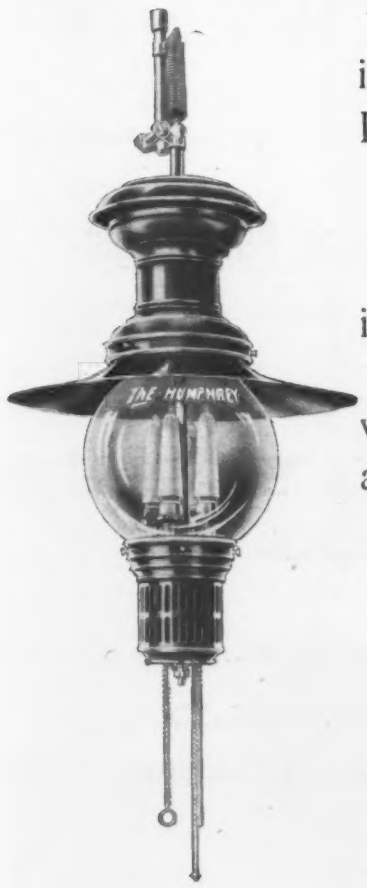

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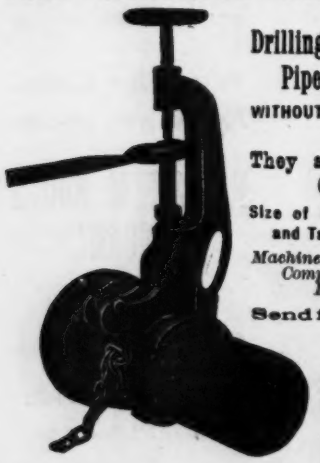

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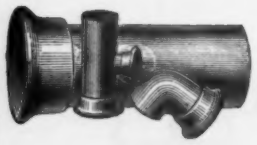

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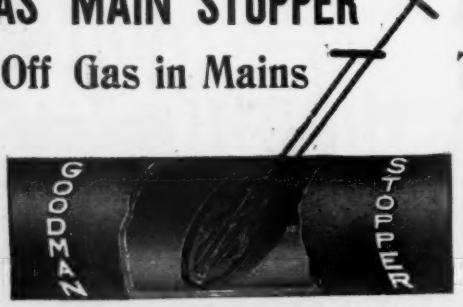

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For the Year 1905.

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PUBLIC LIGHTING TABLE.

DECEMBER, 1906.

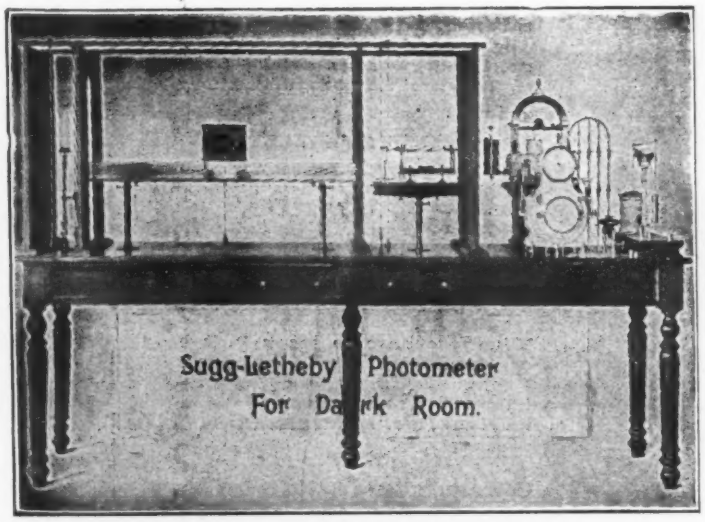
Table No. 1.
FOLLOWING THE MOON.

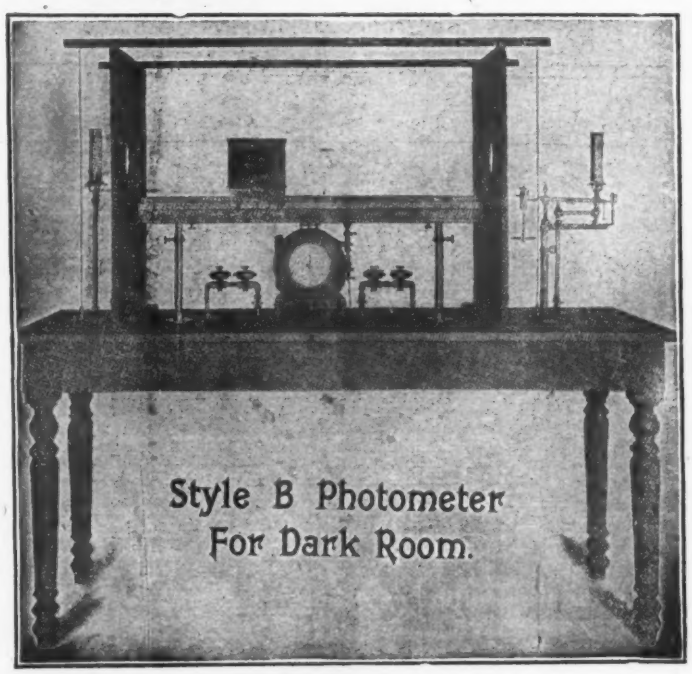
Day of Week.	Date.	Light.	Extinguish.
Sat.	1	No L.	No L.
Sun.	2	5.00 PM	7.10 PM
Mon.	3	5.00	8.00
Tue.	4	5.00	8.50
Wed.	5	5.00	9.40
Thu.	6	5.00	10.40
Fri.	7	5.00	11.40
Sat.	8	5.00 LQ	12.40 AM
Sun.	9	5.00	1.50
Mon.	10	5.00	3.00
Tue.	11	5.00	4.00
Wed.	12	5.00	6.10
Thu.	13	5.00	6.10
Fri	14	5.00	6.10
Sat.	15	5.00 NM	6.10
Sun	16	5.10	6.20
Mon.	17	5.10	6.20
Tue.	18	5.10	6.20
Wed.	19	5.10	6.20
Thu.	20	9.20	6.20
Fri.	21	10.20	6.20
Sat.	22	11.20 FQ	6.20
Sun.	23	12.30 AM	6.20
Mon.	24	1.20	6.20
Tue.	25	2.20	6.20
Wed.	26	3.20	6.20
Thu.	27	4.10	6.20
Fri.	28	5.10	6.20
Sat.	29	No L.	No L.
Sun.	30	No L. FM	No L.
Mon.	31	No L.	No L.

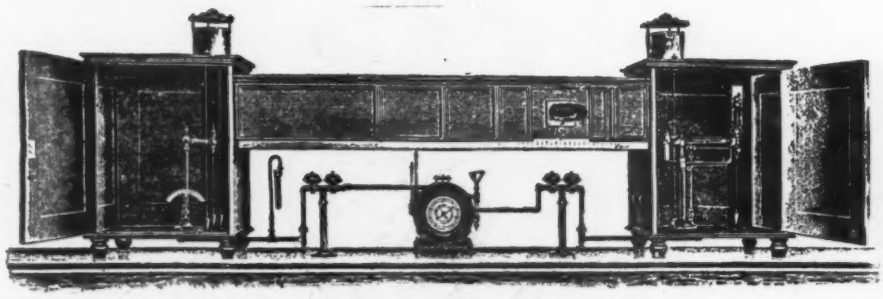
TOTAL HOURS DURING 1906.

By Table No. 1.

	Hrs.Min.
January	223.40
February	190.40
March	192.10
April	167.00
May	152.20
June	142.10
July	150.20
August	157.40
September	170.00
October	185.10
November	201.40
December	214.00
Total, yr.	2146.50







Closed Photometer For Light Room.

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PUBLIC LIGHTING TABLE.

DECEMBER, 1906.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Light	Extinguish.
		P. M.	A.M.
Sat.	1	4.20	6.10
Sun.	2	4.20	6.10
Mon.	3	4.20	6.15
Tue.	4	4.20	6.15
Wed.	5	4.20	6.15
Thu.	6	4.20	6.15
Fri.	7	4.20	6.15
Sat.	8	4.20	6.15
Sun.	9	4.20	6.15
Mon.	10	4.20	6.20
Tue.	11	4.20	6.20
Wed.	12	4.20	6.20
Thu.	13	4.20	6.20
Fri.	14	4.20	6.20
Sat.	15	4.20	6.20
Sun.	16	4.20	6.20
Mon.	17	4.20	6.20
Tue.	18	4.20	6.20
Wed.	19	4.20	6.20
Thu.	20	4.20	6.20
Fri.	21	4.20	6.20
Sat.	22	4.20	6.20
Sun.	23	4.20	6.20
Mon.	24	4.20	6.25
Tue.	25	4.20	6.25
Wed.	26	4.20	6.25
Thu.	27	4.20	6.25
Fri.	28	4.20	6.25
Sat.	29	4.20	6.25
Sun.	30	4.20	6.25
Mon.	31	4.20	6.25

TOTAL HOURS DURING 1906.

By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

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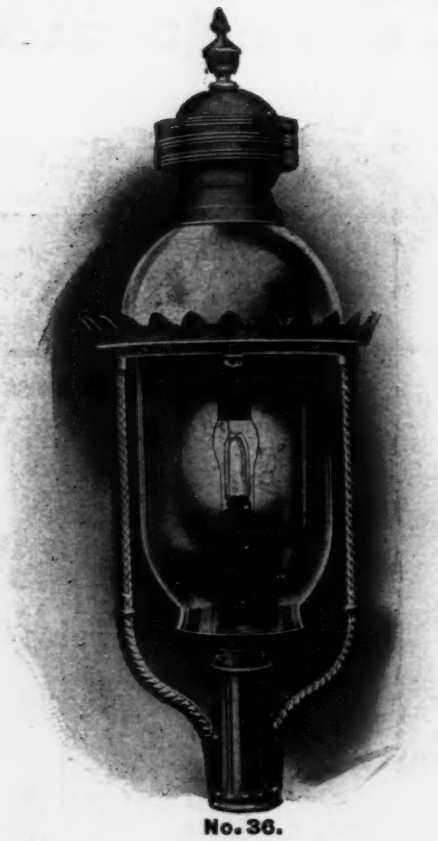

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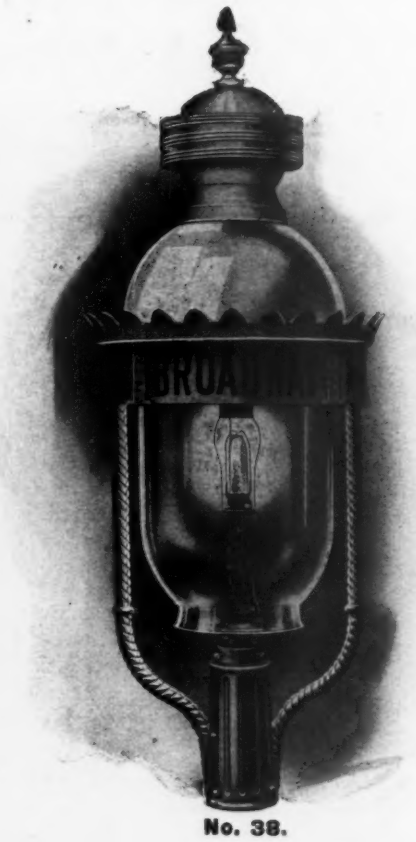

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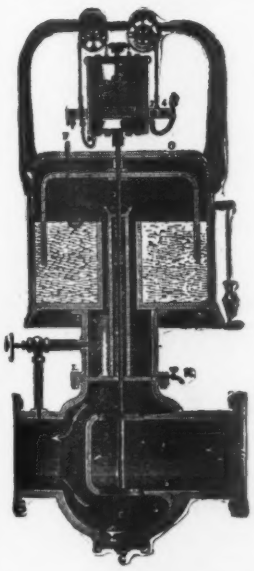

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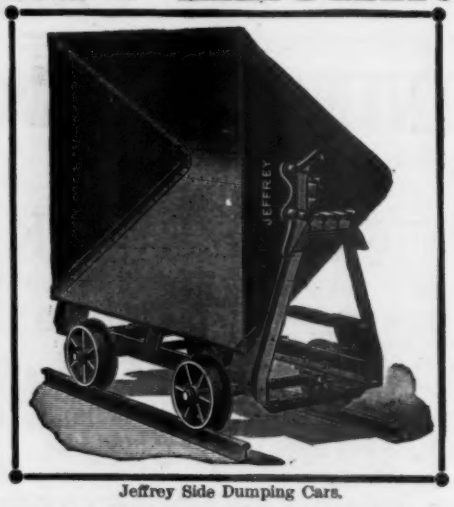

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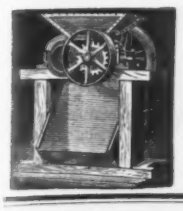

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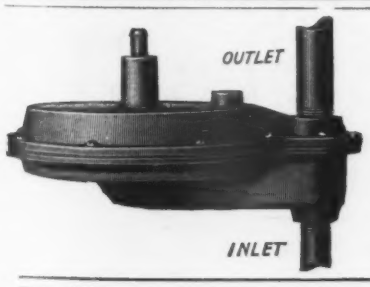

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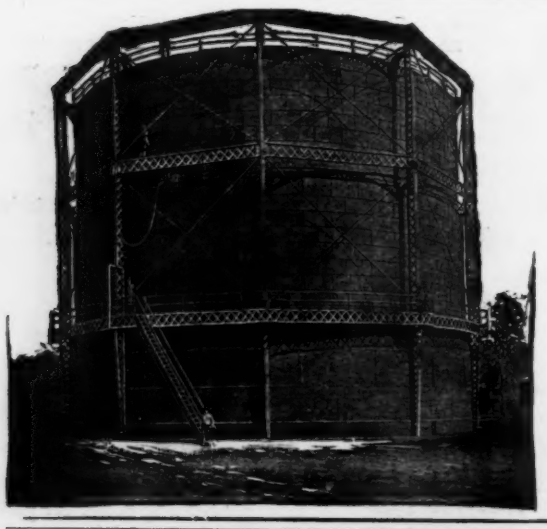

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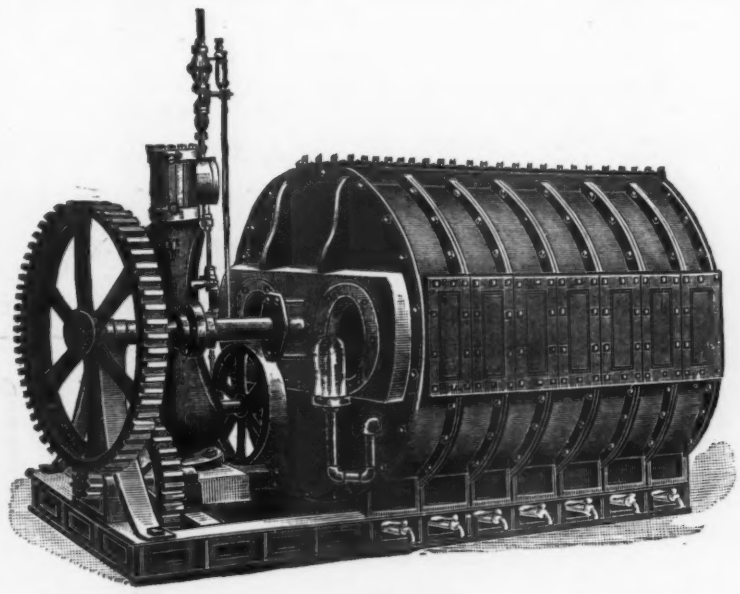

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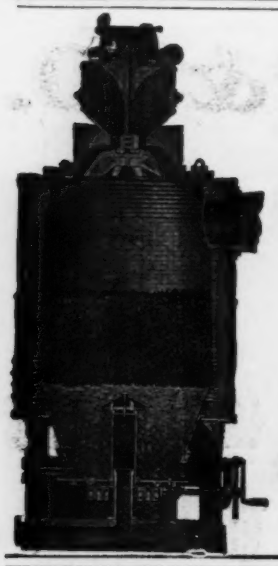

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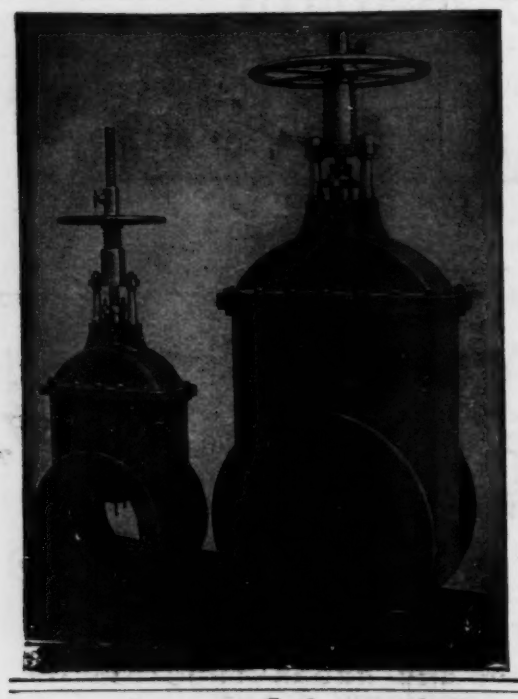

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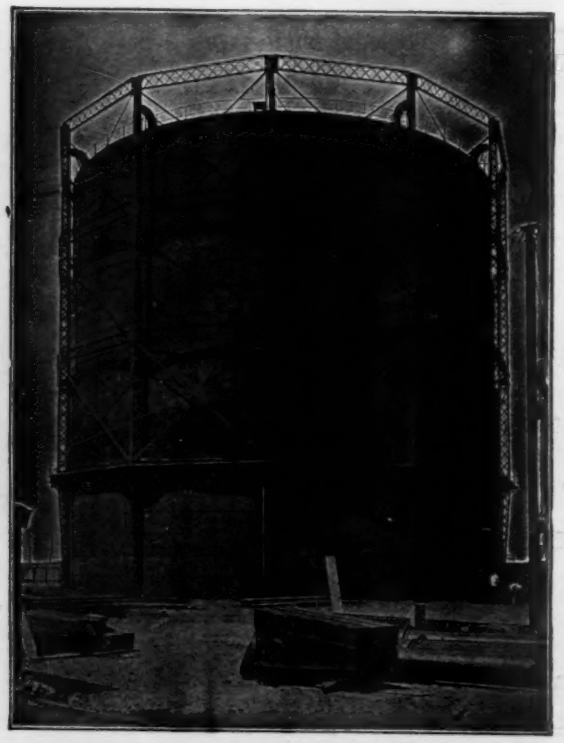

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